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Dr. Balwinder Kaur Rekhi

Department of Anaesthesia

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Editorial

MULTIDISCIPLINARY APPROACH TO CHRONIC PAIN MANAGEMENT

Dr. Balwinder Kaur Rekhi

The current International Association for the Study of Pain (IASP) defines pain as ‘‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage’’.(1)

This definition recognizes the interplay between the objective, physiological sensory aspects of pain and its subjective, emotional, and psychological components.The response to pain can be highly variable among different individuals as well as in the same person at different times. There are differences related to both gender and age in pain perception, experiences, and coping strategies.
The term nociception is derived from noci (Latin for harm or injury) and is used to describe neural responses to traumatic or noxious stimuli. All nociception produces pain, but not all pain results from nociception. Many patients experience pain in the absence of noxious stimuli. It is therefore clinically useful to divide pain into one of two.
categories: (1) acute pain, which is primarily due to nociception, and (2) chronic pain, which may or may not be due to nociception and in which psychological and behavioral factors often play a major role.

However, Chronic pain persists beyond the usual course of an acute disease or after a reasonable time for healing to occur, typically 1 to 6 months. Chronic pain may be nociceptive, neuropathic, or mixed. Psychological mechanisms or environmental factors, or both, frequently play a major role. Patients with chronic pain often have attenuated or absent neuroendocrine stress responses related to the pain and prominent sleep and mood disturbances. Neuropathic pain is classically paroxysmal and lancinating, has a burning quality, and is associated with hyperpathia-an uncomfortable or painful response to a normally innocuous stimulus. When it is also associated with loss of sensory input (eg, amputation) into the central nervous system, it is termed deafferentation pain. When the sympathetic system plays a major role, it is often termed sympathetically maintained pain.(2)

The most common forms of chronic pain include those associated with musculoskeletal disorders, chronic visceral disorders, lesions of peripheral nerves, nerve roots, or dorsal root ganglia (including diabetic neuropathy, causalgia, phantom limb pain, and postherpetic neuralgia), lesions of the central nervous system (stroke, spinal cord injury, multiple sclerosis), and cancer pain. The pain of most musculoskeletal disorders (eg, rheumatoid arthritis and osteoarthritis) is primarily nociceptive, whereas pain associated with peripheral or central neural disorders is primarily neuropathic. The pain associated with some disorders, such as cancer and chronic back pain (particularly after surgery), is often mixed.(3)

Clinical shreds of evidence lead us to assert that pain can be considered as “biopsychosocial perception” since it mimics a unique individual patient experience with multifactorial genesis. Moreover, it represents a dynamic experience, highly variable in a spatial-temporal manner; thus, it is not imaginable to assume its therapy as universally applicable.Thus, it is necessary to re-think the concept of pain management. Pain treatments need to follow multimodal approaches (pharmacological and nonpharmacological agents)
PHARMACOLOGICAL INTERVENTIONS: includes drug therapy and procedural therapy.

Drug therapy in pain management include acetaminophen, cyclooxygenase (COX) inhibitors, antidepressants, neuroleptic agents, anticonvulsants, corticosteroids, systemic administration of local anesthetics, and opioids.

ACETAMINOPHEN

oral analgesic and antipyretic agent that is also available as an intravenous preparation. It inhibits prostaglandin synthesis but lacks significant anti-inflammatory activity.

Acetaminophen has few side effects but is hepatotoxic at high doses. The recommended adult maximum daily limit is 3000 mg/d, reduced from a previously recommended limit of 4000 mg/d.(4)

Nonsteroidal Anti - inflammatory Drugs (NSAIDs)

NSAIDS inhibit prostaglandin synthesis by inhibiting cyclooxygenase activity.Prostaglandins sensitize and amplify nociceptive input, and blockade of their synthesis results in the analgesic, antipyretic, and anti-inflammatory properties characteristic of NSAIDs. The most common side effects of aspirin (acetylsalicylic acid, ASA) and other NSAIDs are stomach upset, heartburn, nausea, and ulceration of the gastric mucosa. Diclofenac is available as both an oral preparation and a topical gel or patch that may be less likely to contribute to gastric distress. Other side effects of NSAIDs include dizziness, headache, and drowsiness. With the exception of selective COX-2 inhibitors, all COX inhibitors decrease platelet aggregation. (4)

Analgesic	Onset (h)	Dose (mg)	Dosing Interval (h)	Maximum Daily Dosage (mg)
Salicylates				
Acetylsalicylic acid (aspirin)	0.5-1.0	500-1000	4	3600-3600
Diflunisal (Dolobid)	1-2	500-1000	8-12	1500
Choline magnesium trisalicylate (Trilisate)	1-2	500-1000	12	2000-3000
p-Aminophenols				
Acetaminophen (Tylenol, others)	0.5	500-1000	4	1200-4000
Proprionic acids				
Ibuprofen (Motrin, others)	0.5	400	4-6	3200
Naproxen (Naprosyn)	1	250-500	12	1500
Naproxen sodium (Anaprox)	1-2	275-550	6-8	1375
Indoles				
Indomethacin (Indocin)	0.5	25-50	8-12	150-200
Ketorolac (Toradol)	0.5-1	10	4-6	40
COX-2 Inhibitors				
Celecoxib (Celebrex)	3	100-200	12	400

ANTIDEPRESSANTS

Antidepressants are most useful for patients with neuropathic pain and demonstrate an analgesic effect that occurs at a dose lower than that needed for antidepressant activity. Both of these actions are due to blockade of presynaptic reuptake of serotonin, norepinephrine, or both. Older tricyclic agents appear to be more effective analgesics than selective serotonin reuptake inhibitors (SSRIs). Serotonin and norepinephrine reuptake inhibitors (SNRIs) may provide the most favorable balance between analgesic efficacy and side effects. Antidepressants potentiate the action of opioids and frequently help normalize sleep patterns. (5)

Antispasmodics & Muscle Relaxants

Antispasmodics may be helpful for patients with musculoskeletal sprain and pain associated with spasm or contractures. Tizanidine (Zanaflex) is a centrally acting α2- adrenergic agonist used in the treatment of muscle spasm in conditions such as multiple sclerosis, low back pain, and spastic diplegia. Baclofen (Gablofen, Lioresal), a GABAB receptor agonist, is particularly effective in the treatment of muscle spasm associated with multiple sclerosis or spinal cord injury when administered

by continuous intrathecal drug infusion. (5)

Corticosteroids

Glucocorticoids are extensively used in pain management for their anti-inflammatory and possibly analgesic actions. They may be given topically, orally, or parenterally (intravenously, subcutaneously, intraarticularly, or epidurally). (6)

Drug	Routes Given1	Glucocorticoid Activity	Mineralocorticoid Activity	Equivalent Dose (mg)	Half-life (h)
Hydrocortisone	O,I,T	1	1	20	8-12
Prednisone	O	4	0.8	5	12-36
Prednisolone	O,I	4	0.8	5	12-36
Methylprednisolone (Depo-Medrol, Solu-Medrol)	O,I,T	5	0.5	4	12-36
Triamcinolone (Aristocort)	O,I,T	5	0.5	4	12-36
Betamethasone (Celestone)	O,I,T	25	0	0.75	36-72
Dexamethasone (Decadron)	O,I,T	25	0	0.75	36-72

O, Oral; I, injectable; T, topical.
Data from Goodman L.S. Gilman AG, *The Pharmacologic Basis of Theropeutics. 8th ed.* New York, NY : Pergamon, 1990.

Anticonvulsants

Anticonvulsant medications are useful for patients with neuropathic pain, especially trigeminal neuralgia and diabetic neuropathy, because they can suppress the spontaneous neural discharges that play a major role in these disorders. The most commonly utilized agents are phenytoin, carbamazepine, valproic acid, clonazepam, and gabapentin. (7)

Local Anesthetics

Systemic infusion of local anesthetic medication produces sedation and central analgesia and is occasionally used in the treatment of patients with neuropathic pain. Lidocaine and procaine are the most commonly used agents. They are given either as a slow bolus or by continuous infusion. Lidocaine is given by infusion over 5 to 30 min for a total of 1 to 5 mg/kg. Procaine, 200 to 400 mg, can be given intravenously over the course of 1 to 2 h. Monitoring by qualified medical personnel should include electrocardiography, blood pressure, respiration, pulse oximetry, and mental status, and full resuscitation equipment must be immediately available. (7)

α2-Adrenergic Agonists

The primary effect of α2-adrenergic agonists is the activation of descending inhibitory pathways in the spinal cord dorsal horn. Epidural and intrathecal α2-adrenergic agonists are particularly effective in the treatment of neuropathic pain and opioid tolerance. Clonidine (Catapres), a direct-acting α2-adrenergic agonist, is effective as an adjunctive medication in the treatment of severe pain. (7)

OPIOIDS

Opioids are the mainstay of treatment in chronic pain management. Can be given orally as well as parenterally. Parenteral opioids as Intravenous, intraspinal (epidural or intrathecal), or transdermal routes of opioid administration may be utilized when the patient fails to adequately respond to or is unable to tolerate oral regimen. Transdermal fentanyl (Duragesic patch) is an alternative to sustained-release oral morphine and oxycodone preparations, particularly when oral medication is not possible. Currently available patches are constructed as a drug reservoir that is separated from the skin by a microporous rate-

limiting membrane and an adhesive polymer. A very large quantity of fentanyl (10 mg) provides a large force for transdermal diffusion.

PROCEDURAL THERAPY includes Diagnostic & Therapeutic Blocks

Local anesthetic nerve blocks are useful in delineating pain mechanisms, and they play a major role in the management of patients with acute or chronic pain. Pain relief following diagnostic nerve blockade carries favorable prognostic implications for a subsequent therapeutic series of blocks. In selected patients,"permanent" neurolytic nerve blocks may be appropriate. The efficacy of nerve blocks is due to interruption of afferent nociceptive activity, which may be in addition to, or in combination with, blockade of afferent and efferent limbs of abnormal reflex activity involving sympathetic nerve fibers and skeletal muscle innervation. The pain relief frequently outlasts the known pharmacological duration of the agent employed by hours or up to several weeks. The selection of the type of block depends on the location of pain, its presumed mechanism, and the experience and skill of the treating physician. Local anesthetic solutions may be infiltrated locally or injected at specific peripheral nerve, somatic plexus, sympathetic ganglia, or nerve root sites, or they may be administered epidurally or intrathecally.

Radiofrequency Ablation & Cryoneurolysis

Percutaneous radiofrequency ablation (RFA) relies on the heat produced by current flow from an active electrode that is incorporated at the tip of a special needle. The needle is positioned using fluoroscopic guidance. Electrical stimulation (2 Hz for motor responses, 50 Hz for sensory responses) and impedance measurement via the electrode prior to ablation also help confirm correct electrode positioning. Depending on the location of the block, the heating temperature generated at the electrode is precisely controlled (60–90°C for 1–3 min) to ablate the nerve without causing excessive collateral tissue damage. RFA is commonly used for trigeminal rhizotomy and medial branch (facet) rhizotomy. It has also been used for dorsal root rhizotomy and lumbar sympathectomy, and it may be effective for medial branches of the spinal nerves that innervate facet joints. Pain relief is usually limited to 3 to 12 months due to nerve regeneration after RFA. (4)

Neuromodulation

Electrical stimulation of the nervous system can produce analgesia in patients with acute and chronic pain. Current may be applied trans-cutaneously, epidurally, or by electrodes implanted into the central nervous system.

NON PHARMACOLOGICAL METHODS:

Psychological Interventions Psychological techniques, including cognitive therapy, behavioral therapy, biofeedback, relaxation techniques, and hypnosis, are widely used as part of a multi-disciplinary approach to pain control.

Cognitive interventions are based on the assumption that a patient's attitude toward pain can influence the perception of pain. Maladaptive attitudes contribute to suffering and disability. Pain coping skills are taught either individually or in group therapy. The most common techniques include attention diversion and imagery.

Behavioral (operant) therapy is based on the premise that behavior in patients with chronic pain is determined by consequences of the behavior. Positive reinforcers (such as attention from a spouse) tend to enable or intensify the pain, whereas negative reinforcers reduce pain. The therapist's role is to guide behavior modification with the aid of family members and medical providers to nurture negative reinforcers and minimize positive reinforcers.

Relaxation techniques teach the patient to alter the arousal response and the increase in sympathetic tone associated with pain. The most commonly employed technique is a progressive muscle relaxation exercise.

Biofeedback and hypnosis are closely related interventions. All forms of biofeedback are based on the principle that patients can be taught to control involuntary physiological parameters. Once proficient in the technique, The patient may be able

to induce a relaxation response and more effectively apply coping skills to control physiological factors (eg, muscle tension) that worsen pain. The most commonly utilized physiological parameters in biofeedback are muscle tension (electromyographic biofeedback) and temperature (thermal biofeedback). The effectiveness of hypnosis varies considerably among individuals. Hypnotic techniques teach patients to alter pain perception by having them focus on other sensations, localize the pain to another site, and dissociate themselves from a painful experience through imagery. Patients with chronic headaches and musculoskeletal disorders benefit most from these relaxation techniques. (8)

Physical Therapy

Heat and cold can provide pain relief by alleviating muscle spasm. In addition, heat decreases joint stiffness and increases blood flow, and cold vasoconstricts and can reduce tissue edema. The analgesic action of heat and cold may at least partially be explained by the gate theory of pain processing. Superficial heating modalities include conductive (hot packs, paraffin baths, fluidotherapy), convective (hydrotherapy), and radiant (infrared) techniques. Techniques for application of deep heat include ultrasound as well as shortwave and microwave diathermy. These modalities are more effective for pain involving deep joints and muscles. Cold is most effective for pain associated with acute injuries and edema, and it can also relieve muscle spasm. Application may take the form of cold packs, ice massage, or vapocoolant sprays (ethyl chloride or fluoro-methane).

Exercise should be part of any rehabilitation program for chronic pain. A graded exercise program prevents joint stiffness, muscle atrophy, and contractures, all of which can contribute to the patient's pain and functional disabilities (9)

Acupuncture

Acupuncture can be a useful adjunct for patients with chronic pain, particularly that associated with chronic musculoskeletal disorders and headaches. The technique involves the insertion of needles into discrete, anatomically defined points, called meridians. Stimulation of the needle after insertion takes the form of twirling or of application of a mild electrical current. Insertion points appear to be unrelated to the conventional anatomy of the nervous system. Although the scientific literature concerning the mechanism of action and role of acupuncture in pain management is controversial, some studies suggest that acupuncture stimulates the release of endogenous opioids, as its effects can be antagonized by naloxone. (10)

CONCLUSION

All physicians need to understand the rationale, indications, contraindications, and prescription of physical medicine techniques and their appropriate use. Many of these techniques can be used for acute, subacute, and chronic pain. However, with progression to more chronic pain, techniques should be more active and less passive and more behavioral and cognitive in nature. Although many of these techniques will help decrease pain, the long-term goal should be to increase function despite the presence of the pain syndrome. Patients with pain can be evaluated and treated by individual physicians and therapists. This type of approach is more often used and successful in patients with acute or subacute pain. However, as the pain becomes more chronic, a multi disciplinary or interdisciplinary approach is recommended. The role of the therapy team in a pain program should be comprehensive and interdisciplinary. Typically, the team is led by a physician and consists of physical therapists, occupational therapists, and often recreational therapists, dieticians, and psychologists. Combined assessment by these professionals is used to devise a comprehensive approach to allow the patient to benefit maximally, reintegrate fully into life, and have as few restrictions as possible.

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Original Research Article

Feasibility of Posterior Component Separation with Transversus Abdominis Release in Complex Ventral Hernias : Outcomes and Experience at a Single Centre

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Abstract

Introduction : Complex ventral hernias are a challenging entity which require some form of myofascial separation to achieve a tension free repair and adequate mesh placement. Posterior component separation with transversus abdominis release (TAR) has come up as an exciting tool in achieving the same albeit preserving the neurovascular arcade and recording lesser wound morbidity. In this study, we present our experience with this technique whilst operating on patients with complex ventral hernias.

Methodology : 20 patients requiring TAR (based upon the pre-operative imaging fulfilling the required criteria of defect width or size or the intra-operative need) were included in the study extending from January 2021 to April 2023. All the patients were operated at a single centre by the same surgical team.

Results : Majority of the patients were females (12; 60%) with a mean age of 56.4 years, a mean BMI of 28.8kg/m2 and a median ASA score of 2. Three of these patients had loss of domain. Fifteen (75%) patients had a history of previous surgery (incisional hernia). The mean defect width and total defect area were 10.8 + 2.16 cm and 193 + 20.45 (110-450) cm2, respectively. The mean surgical time was 207 minutes with an average of 7.8cm of medialisation of linea alba achieved. The mean visual analog scale (VAS) pain score on the first postoperative day was 4.2 and the median hospital length of stay (LOS) was 5 days. There were only four (20%) cases of minor wound related complications which were managed conservatively with no major complication/ re-surgery recorded. During the follow-up period (mean of 21.6 months), only one (5%) recurrence was recorded.

Conclusion : TAR offers an excellent option in managing complex and large ventral hernias with fairly less complications and wound morbidity adding to the armamentarium of the hernia surgeon.

Keywords : TAR, ventral hernia, component separation

Introduction :

Hernia is classically defined as abnormal protrusion of an organ through the wall that contains it. Ventral hernias comprise a group of hernias occurring in the anterior abdominal wall. Hernia surgery has fascinated surgeons worldwide and the proof could be seen in the numerous surgical techniques in vogue for management of these hernias. However, at the crux of these techniques lies the basic underlying goal of a tension free mesh hernioplasty. Complex ventral hernias are a challenging entity ascribed, though not exclusively, to hernias with a defect width > 10 cm, with loss of domain (LOD) > 20% or hernias present over a bony prominence, with underlying history of burst abdomen or having multiple hernial defects amongst others. The complexity of a hernia directly influences the outcome, complications as well as the risk of recurrence. Management of these complex ventral hernias have undergone a paradigm of shift with the

advent of myofascial component separation techniques for medialisation of the linea alba as well as creating a large anatomical space for mesh reinforcement. The first attempt at component separation is credited to Ramirez (1990) who described the Anterior Component Separation (ACS) by raising wide skin flaps bilaterally and then incising the external oblique aponeurosis (releasing incisions) at lateral ends to achieve medialisation of defect edges for closure.[1] Despite fairly good midline myofascial advancement, higher rate of local wound complications (infections, seroma, etc) as well as recurrence was seen.[1-3] Notwithstanding further modifications such as the endoscopic ACS and perforator sparing techniques, the rates of wound morbidity remained high.[4,5] The focus then shifted to utilising the retrorectus space, which was fully illustrated by Rives-Stoppa in their 'retrorectus repair'. The latter uses a 6-8 cm space between the bilateral recti and their posterior sheath to place a sublay mesh and gained widespread acceptance. [6,7]. However, the area for mesh coverage is restricted bilaterally by the linea semilunaris. Further, a large defect precludes medialisation of linea alba and midline defect closure. In view of the same, transversus abdominis release (TAR), a modification of the Rives-Stoppa procedure, was described by Novitsky et al. in 2012.[8] In the TAR technique, the fibers of the transversus abdominis muscle, which emerges behind the internal oblique aponeurosis are divided to enter a vast potential pre-peritoneal space and merge the same with the retrorectus space to secure a wide mesh. This technique, labelled as the Posterior Component Separation (PCS) with TAR has subsequently been found to have lower recurrence rates and fewer severe wound infections compared to other previously described techniques and has thus gained popularity in the surgical parleys especially in the management of complex hernias.[9] As of date, The 2023 European Hernia Society guidelines suggests a PCS with TAR in the following conditions:[10]

(a) if the fascial defect width > 8 cm
(b) or the area of the defect > 164 cm2
(c) or the Rectus-defect width ratio (RDR) < 1.34
(d) or the Component separation index (CSI) is > 0.146.

This article presents our experience with the use of PCS with TAR and its outcomes for management of complex ventral hernias at a single surgical centre.

Material and Methods

This study is a retrospective analysis of a prospective data set in the patients undergoing PCS with TAR technique for complex ventral hernia performed by a single surgical team at a tertiary care centre between January 2021 to March 2023.

The inclusion criteria were

(a) patients with defect or multiple cumulative defects ≥ 8 cm in width
(b) hernias with loss of domain (LOD)
(c) ventral hernias with CT imaging showing either an area > 164 cm2 or RDR < 1.34 or CSI > 0.146.
(d) those ventral hernias in whom the linea alba could not be medialised with a standard retrorectus technique.

The exclusion criteria were patients not requiring TAR for hernial repair or the ones not consenting to be a part of the study.

The study was commenced after obtaining the institutional ethical clearance and a thorough informed and written consent was taken from all the patients who were selected for the study. Routine laboratory tests and physical examinations were performed preoperatively on all patients. Preoperative computed tomography (CT) scan was used to measure the defect size, abdominal wall anatomy and hernia content of all patients. Tanaka's index was calculated in suspected LOD patients. RDR and CSI were duly calculated on the CT. RDR was calculated as the ratio of the sum of width of both the recti to the defect width while the CSI was calculated as the value of angle formed between the aorta and the two edges of the defect divided by 360. The hernia was assigned the EHS ventral hernia category. Demographic data was collected alongside the patient's BMI, comorbidities, and American Society of Anaesthesiology (ASA) score. Inoperative outcomes such as operative time, the type of TAR (one-sided or bilateral), the extent of myofascial medialisation achieved and additional procedures performed (if any) such as panniculectomy, partial omentectomy or inadvertent tissue injury (eg. Enterotomy) were duly

recorded. Post-operative outcomes were measured in form of post-operative pain on day one (using VAS scale), length of hospital stay (LOS) (in days) and incidence of post-operative minor (Clavien-Dindo grade 1 or 2) and major (grade 3-5) complications. Follow-up evaluation of all patients was done at one month, 6 months and a year (yearly thereafter) to rule out long term complications such as chronic pain, mesh infection, chronic seroma formation or hernia recurrence rates. The SPSS 22 software was used for statistical analysis of all data. Categorical variables are presented as n (%), and continuous variables are presented as mean ±SD.

Surgical Technique

The preoperative prophylaxis with Injection Ceftriaxone 1g is administered 30 minutes prior to the surgery. The patient position is supine with arms abducted. A nasogastric tube and a urinary catheter are placed after induction of general anaesthesia. Skin is prepared for asepsis and a midline laparotomy is fashioned (from virgin area in cases of incisional hernias). The hernia sac is preserved to the extent feasible as it may be needed to augment bridging the linea alba. Meticulous adhesiolysis is done and the underlying viscera prevented from any inadvertent injury. Then, the retrorectus plane is developed by incising the posterior rectus sheath, about 0.5-1cm from its medial border on one side. Retromuscular dissection is performed until the neurovascular bundles are seen at the linea semilunaris. At this point, the posterior lamina of the internal oblique aponeurosis is divided 0.5–1cm. medial to the linea semilunaris to expose the fibers of the transversus abdominis muscle (TAM). The TAM fibers are then divided cephalad to caudal and the cut distal fibres are swept up to develop a vast pre-peritoneal/ pre-fascia transversalis space. The whole procedure is repeated on the other side following which a large space (Rives-Stoppas and the pre-peritoneal space merged) extending from the xiphisternum to the space of Reitzus below and the posterior axillary lines laterally is created wherein a large prosthetic mesh can be placed. In cases of LOD hernias, a partial omentectomy may be performed to facilitate closure without risk of abdominal hypertension. The posterior layer is closed using a running slowly-absorbing sutures. Thereafter, a large mesh is placed in the space created above and secured at two or three points. Suction drain is kept over the mesh. The midline is then closed with a nonabsorbable continuous sutures. A panniculectomy may be performed if required.

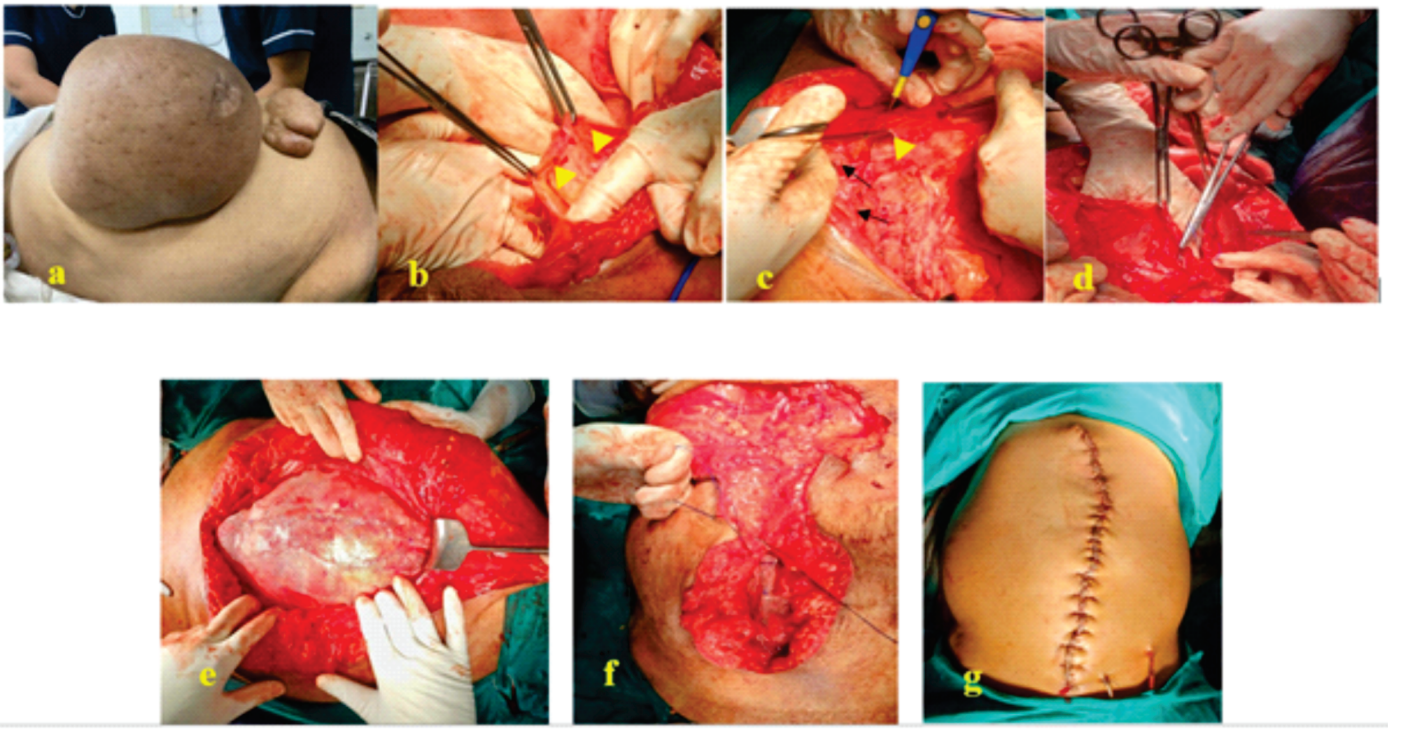

Figure -1 : Surgical steps TAR (a) One of the cases with pre-operative presentation (b) Entering the retro-rectus space by incising the posterior rectus sheath (yellow arrowheads) (c) Release of the Transversus Abdominis muscle (yellow arrowhead) about 0.5-1cm medial to the neurovascular bundle in retrorectus space at linea semilunaris (black arrows) (d) Myofascial medialisation with posterior midline closure facilitated by TAR (e) Placement of a large mesh in the retrorectus-retroperitoneal space created (f) Anterior fascial closure over the mesh (g) final outcome with panniculectomy

Postoperative Care : DVT prophylaxis was followed for the hospital stay. Early mobilization and initiation of enteral feeds was promoted. Suction drains were removed when the output became clear and dropped to less than 50 mL per day. The patients were discharged once on full oral feeds and with reasonable pain control.

Results

Twenty patients underwent PCS with the TAR technique between January 2021 and April 2023. The minimum follow-up was for 12 months (mean of 21.6 months). Majority of the patients were females (n=12; 60%). The patients had a mean age of 56.4 + 7.34 years, a mean BMI of 28.8 + 3.01 kg/m2, and a median ASA score of 2.0. Fifteen (75%) patients presented with post laparotomy incisional hernia with a history of burst abdomen. The patient demographic profile is summarized in Table 1.

Parameter		**Value**
Mean age (years)		56.4 ± 7.34
Male : Female		8 : 12 (40:60%)
Mean BMI (kg/m^2)		28.8 ± 3.01
Median ASA score		2
Incisional hernia cases (post laparotomy)		15 (75%)
Comorbidity	Hypertension	12 (60%)
	Diabetes	10 (50%)
	COPD	6 (30%)
	Others	3 (15%)

Table -1 : Patient demographic profile

The extent and the type of hernia was characterised using preoperative CT scan and the EHS category given accordingly. Three patients had LOD which was established using the Tanaka's index (> 0.25). Additionally, CT was used to calculate width of the defect and the defect area which had mean values of 10.8 + 2.16 cm and 193 + 20.45 cm2 (range 110-450 cm2). Lastly, the CT was used to calculate RDR and CSI which had mean values of 1.04 + 0.14 and 0.192+ 0.19 respectively. Thereafter, the patients underwent TAR surgery with 18 (90%) undergoing bilateral TAR whilst the remaining two underwent unilateral TAR with Rives-Stoppa procedure. Important peri-operative outcomes are elicited in Table – 2. Posterior midline myofascial closure was achieved in all the cases and no intra-operative adverse outcomes (visceral/ bowel injury) were observed though three patients had bowel seromuscular tears during adhesiolysis which were appropriately repaired.

CT Findings	
Most common hernia (EHS)	M3 (n =13; 65%)
Mean defect width (cm)	10.8 ± 2.16 cm
Mean Defect size (cm^2)	193 ± 20.45 cm^2
Mean RDR	1.04 ± 0.14
Mean CSI	0.192 ± 0.19
Patients with LOD	3 (15%)
Intra-operative findings	
Bilateral vs unilateral TAR	18 vs 2
Mean operative time (mins)	207 ± 23.42 mins
Mean medialisation of myofascia achieved (cm)	7.8 ± 1.06 cm
Partial omentectomy	4 (20%)
Most common mesh size used	30 x 30 cm
Vertical panniculectomy	6 (30%)

Table – 2 : Peri-operative parameters (Pre surgery CT findings and intra operative record)

Post operative outcomes

The mean VAS pain score on the first postoperative day was 4.2 and the median hospital LOS was 5 days. Four patients (20%) developed

minor post-operative complications (Clavien Dindo Grade 1 or 2) with two having clinical seroma and one each having a hematoma and superficial SSI which responded well to antibiotics. None of the patients had deep SSI or major post operative complication (Clavien Dindo grade 3-5). No mortality was recorded. Majority (n = 15; 75%) were followed up for two years. On long term follow up, two patients (10%) complained of chronic pain whilst one patient had hernia recurrence (5%) at two years due to central mesh failure. Salient post-operative outcomes are illustrated in Table- 3

Early outcomes		
Mean VAS (at day 1)		4.2
Mean Hospital LOS (days)		5.4 days
Minor complications	Seroma	2 (10%)
	Hematoma	1 (5%)
	Superficial SSI	1 (5%)
Major complications/ Mortality		-
Long term outcomes		
Chronic pain		2 (10%)
Recurrence		1 (5%)
Chronic seroma/Others		-

Table – 3 : Post operative outcomes

Discussion

The TAR technique incorporates a posterior myofascial release with the classical Rives-Stoppa retrorectus dissection thus providing enhanced medialisation of the linea alba, decreased tension on the closure as well as creating a large retromuscular and preperitoneal space with preservation of the neurovascular arcade allowing for placement of large mesh.[8,9,11] The PCS with TAR offers a promising surgical solution for complex ventral hernias with lesser wound morbidity, lower recurrence rates and thus improved patient outcomes in comparison to other techniques in vogue.[9] Krapta DM et al. (2012) compared ACS and PCS with TAR and reported a lower recurrence rate (14% versus 4%) and a lower wound complication rate (48.2% versus 25.5%) for TAR although recent studies with improvised ACS techniques such as perforator sparing ones have shown lower wound adverse outcomes.[2,4,5] Recent studies by Bilezikian JA (2021) and Gala J et al. (2023) comparing ACS and TAR have showed similar one-year recurrence rates and quality of life though the surgical site occurrences, especially the worse wound complications were observed in ACS.[11,12] Laparoscopic and robotic approaches have come up in TAR with robotic TAR (R-TAR) and hybrid robotic TAR (hrTAR) techniques having lesser hospital stay and systemic and local complications albeit with significantly longer operative hours.[13,14]

Operative times for the open TAR technique range from 188 minutes to 383 minutes in literature.[9,15-17] The mean operative time in the present study was 207 minutes, comparable to the abovementioned studies. TAR offers an excellent medialisation of the myofascia thus allowing for tension-free linea alba closure. A fascial closure was achieved in all the patients with an average medialisation of 7.8 + 1.06 cm. Most studies have reported fascial closure rates of 97-100%.[9,18] In case a midline closure is not possible, bridging of the fascial edges may be achieved by using the hernial sac (if available) or a heavyweight mesh. Partial omentectomy was performed in four patients, three of whom were preoperatively detected with LOD on CT imaging. Other commonly used techniques in LOD patients are the use of pre-operative Botulinum Toxin A injections and preoperative progressive pneumoperitoneum. In the literature, a routine panniculectomy in TAR procedures has been shown to increase the risk of wound morbidity though Sadava et al. performed panniculectomy on 60% of their patients and declared similar SSI rates.[19] Six patients (30%) needed vertical panniculectomy in our study. In contrast to the study mentioned above, all SSIs were seen in panniculectomy patients. The median hospital LOS was 5 (mean 5.2, 2-10) days which is comparable to those in other studies (4.0 to 9.0 days).[8,9,1912,14,16]

SSIs rate in TAR have been reported between 27 and 41% patients with deep mesh infection rate of 5% to 10%.[18] Despite the high SSI rate, most of these infections are benign requiring no more than extended antibiotic cover.[18,20] In the present study too, there were four cases (20%) of mild surgical site

adversity in form of seroma (two), hematoma or SSI (one each) which were successfully managed conservatively. We had no cases of deep lying wound or mesh infection. Recurrence is a robust marker for any hernia surgery and is the biggest challenge in complex hernia surgery irrespective of the technique. A meta-analysis reported recurrence rates of 5.7% (3%-8.5%) for the TAR procedure.[18] The recurrence rate of the present study was 5% (one case with central mesh failure), comparable to the aforementioned study. Furthermore, two patients had chronic pain which was managed conservatively.

Limitations

The biggest limitation is the small sample size at a single centre with a relatively limited follow up period to truly gauge the procedure's success rate at preventing recurrence and improving the patient's quality of life in the long run.

Conclusion

The TAR procedure offers excellent advantages of creating a tension free myofascial closure as well as providing an adequate space for mesh reinforcement and bilaminar tissue ingrowth with additional benefits of lesser wound complications and recurrence rates when compared to other techniques in managing complex ventral hernias.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

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Original Research Article

INFECTIOUS CAUSES OF PRURITUS OF PREGNANCY: A STUDY ON EVALUATION AND OUTCOME

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Abstract:

Introduction: Pruritus in pregnancy is a common and burdensome symptom that can occur due to various underlying conditions. It may be the first sign of a pregnancy-specific pruritic disease or a dermatosis that coincides with pregnancy by chance. It is essential to recognize and address this symptom promptly, as some conditions can have detrimental outcomes for both the mother and the foetus.

Aims & Objective: To analyse the various infectious causes of pruritus in pregnancy and their maternal and foetal outcomes.

Material & Method: The present study was conducted in Department of Obstetrics & Gynaecology and Department of Venerology & Dermatology, GMC & Rajendra Hospital, Patiala. It was an observational prospective study in which all the cases presenting with pruritus were taken during the period from May 2020 to April 2021.

Results: During the study period, 218 pregnant women presented with complaint of pruritus. Infection was the most common cause of pruritus in pregnancy accounting for 46.3% subjects. The most commonly reported infection was fungal infection (17.4%). Vaginitis accounted for 15.1% cases with candida vaginalis being the most common (7.8%). Maternal and fetal complications were Preterm delivery, Premature rupture of membrane (PROM), preterm premature rupture of membrane (PPROM), Premature babies and NICU admission.

Conclusion: This study highlights the various causes of pruritus in pregnancy. Infection contributes the major cause of pruritus in pregnancy followed by specific dermatoses in pregnancy. In mother pruritus can cause sleep disturbance and affect quality of life. Among infectious causes like candida vaginalis, bacterial vaginosis and trichomonas can cause preterm delivery, PROM, PPROM, oligohydramnios and LBW babies. Chicken pox in early trimester can cause congenital varicella syndrome. Thus, early diagnosis and prompt treatment can improve maternal and fetal prognosis and can decrease morbidity.

INTRODUCTION

Pregnancy is a state that leads to various hormonal, metabolic and immunological changes, which may influence the functioning and structure of the skin and mucous membrane [1]. Skin changes in pregnancy can be due to physiological changes in pre-existing skin disease or development of new pregnancy specific dermatoses. Itching is also commonest complaints related to dermatoses of pregnancy occurring in up to 14-23% of pregnant women.[2] Pruritus may be so severe that it affects sleep and quality of life. Prevalence influenced by genetic and environmental factors which varies between population worldwide, it has prevalence of 0.7 to 5% in different population. Occurrence of IHCP In Chile 2.4% of all pregnancies are affected with 5% prevalence in women of Araucaria- Indian origin.[3]

Most of the cutaneous changes are benign and get resolved after pregnancy. Many immunological changes occur in pregnancy in maternal immune response which allows foetus to attach to uterus, cytokines profiles get altered towards the Th2

cytokines (IL-4, IL-5, IL-10, IL-13) which favours maintenance of foetus and its survival. Oestrogen suppresses IL-2 production while progesterone promotes the production of IL-4, IL-5, IL-10, and Progesterone has inhibitory effect on TNF-Alfa secretion and glucocorticoid levels which are increased in pregnancy. Progesterone inhibits the IL-1, IL-2, TNF- alfa productions and stimulate IL-10, IL-4.IL-13 production, while in post-partum period there is increase in IL-2, TNF-alfa, and IL-13 synthesis [4].

Most of the dermatoses are benign and get resolve in post-partum period, a few can result in foetal distress, prematurity, and still-birth like Intrahepatic Cholestasis of Pregnancy, Pemphigoid Gestationis and various infectious causes e.g. Fungal, bacterial, viral and parasitic. Few dermatological conditions can risk fetal life and require antenatal surveillance. Hence early diagnosis and prompt treatment can improve maternal and foetal prognosis and can decrease morbidity, thus awareness and recognition of these dermatological condition and familiarity with their treatment and outcome is important. Thus, a study was planned to analyse the various infectious causes of pruritus in pregnancy and their maternal and foetal outcomes.

MATERIAL AND METHODS

The present study was conducted in the department of Obstetrics and Gynaecology Department and Venerology & dermatology department, Rajendra Hospital, Patiala. It was an observational prospective study in which all the cases presenting with pruritus were taken during the period from May 2020 to April 2021 after obtaining approval from ethics committee of our institute.

Subjects were included study after taking consent and finding were filled in predesigned proforma. All patients underwent thorough detailed physical examination with the special emphasis on pruritus. In addition, all women with pruritus assessed its severity according to Visual Analogue Scale (VAS) and Verbal Rating Scale (VRS). The VAS is a 10-cm long horizontal line on which the patient indicates the point corresponding to her pruritus intensity, ranging from "no pruritus" to "worst pruritus imaginable". In clinical studies, it is highly recommended to use at least two methods of assessment of the intensity of pruritus. All participants also classified their pruritus with the 5-point VRS, scoring this symptom verbally as "no pruritus," "mild pruritus," "moderate pruritus," "severe pruritus," and "very severe pruritus.

All pregnant women with singleton or multiple pregnancy, irrespective of parity status and gestational age with or without pregnancy associated complication with or without medical or surgical risk irrespective of their registration status presenting with complaint of pruritus were included in study. All non-pregnant women with complaint of pruritus were excluded from the study Data related to socio-economic status, demographic information, previous obstetric history, associated medical condition were collected from each subject. Maternal age, parity, history of recurrence of pruritus, history of deranged LFT in previous pregnancy, history of viral infection, history of previous skin lesion, history of allergy was taken.

Statistical analysis: The data was compiled, tabulated and analysed at the end of the study period using MS Excel and SPSS version 22.

RESULT

The present study was conducted on 218 pregnant women who presented with complaint of pruritus. Maximum number of patients were in the age group of 20 - 30 years (77.5%), were residing in rural area (88.1%) and belonged to lower class (35.8%). (Table 1)

Age in years	Number of subjects	Percentage (%)
<20	7	3.2
20 -30	169	77.5
≥30	42	19.3
Area		
Rural	192	88.1
Urban	26	11.9
Total	218	100.0
Socio Economic Status		
Lower Class	78	35.8
Upper lower Class	73	33.5
Lower Middle Class	37	16.9
Upper middle Class	30	13.8
Total	218	100.0

Table 1: Sociodemographic profile of subjects

11wk3d was the earliest gestational age which patient had the first complaint of pruritus while in some cases the first time of presentation was late as 38wk2d and mean gestational age for first presentation of pruritus was 25.6 ± 4.5weeks. Most subjects had pruritus onset in 3rd trimester (73.4%). Nearly 50% of the pregnant women who presented with pruritus were gravida G1. (Table 2)

Period of Gestation	Number of subjects	Percentage (%)
1st Trimester	1	0.5
2nd Trimester	57	26.1
3rd Trimester	160	73.4
Gravida		
G1	113	51.8
G2	62	28.4
G3	26	11.9
G4 or more	17	7.9
Total	218	100.0

Table 2: Period of Gestation and Gravida at time of onset of pruritus

On taking the history regarding the characteristics of pruritus, it was found that most common type of sensation felt was tickling (seen in 54.6% subjects) followed by burning sensation in 33% subjects. Also, pruritus experienced by subjects most often occur during evening (in 38.1% subjects), but more than 50% subjects have pruritus during rest of the day. 70.2% of the subjects experienced pruritus over abdomen and chest, while 114(52.3%) experienced itching over hands. 33(15.1%) subjects had anogenital pruritus which has been caused due to bacterial vaginosis, candida or trichomonas infection or genital warts (HPV). (Table 3). 31(14.2%) subjects described pruritus as very mild, 76(34.9%) subjects described pruritus to be mild, 92(42.2%) has pruritus of moderate intensity, 17(7.8%) has pruritus of severe intensity and only 2(0.9%) subjects have pruritus of very severe intensity. (Fig 1)

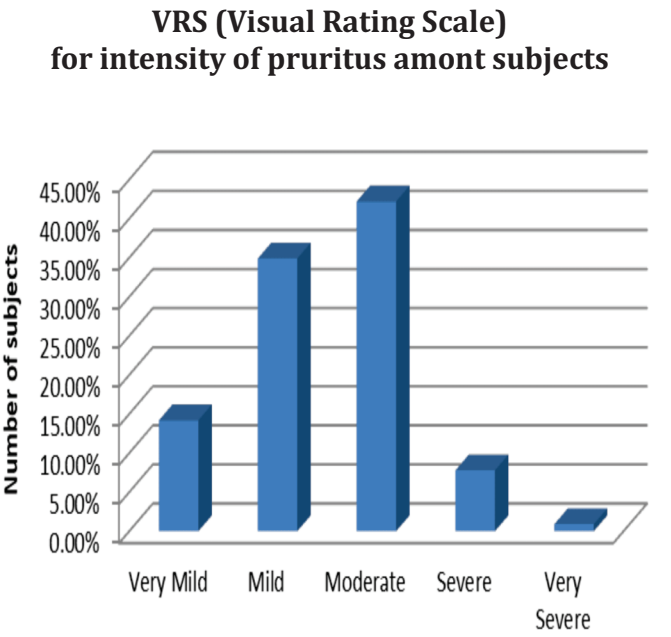
Type of Sensation	Number of subjects *	Percentage (%)
Burning	72	33.0
Pinch	30	13.8
Prickling	17	7.8
Tingling	50	22.9
Pain	3	1.4
Tickling	119	54.6
Timing		
Morning	30	13.8
Afternoon	63	28.9
Evening	83	38.1
Night	42	19.3
Total	218	100.0

Table 3: Characteristics of pruritus in study subjects

Site		
Abdomen & Chest	153	70.2
Hands	114	52.3
Feet & Lower limb	97	44.5
Anogenital	33	15.1

*** Multiple response**

Fig. No 1: VRS (Visual Rating Scale) for scoring of intensity of pruritus in subjects



Out of 218 subjects of pruritus, infection was the most common cause of pruritus in pregnancy accounting for 101(46.3%) subjects. 82(37.6%) subjects had specific dermatoses of pregnancy (includes IHCP, Atopic Eruption in Pregnancy, Polymorphic Eruption in pregnancy and Pemphigoid Gestationis). 30(13.8%) subjects had pruritus in pregnancy in which no primary cause was found, it is classified as pruritus of unknown origin (PUO) or pruritus associated with pregnancy. There were 5 cases in which 3 has history of contact dermatitis while 2 has history of blood transfusion related reaction.

The most common infection reported fungal infection where tinea was seen in 38(17.4%) subjects. There were 33(15.1%) cases of vaginitis in which candida vaginalis was most common (n=17,7.8%); Among 5 cases of warts (HPV), 3 Subjects had genital warts while rest 2 had warts on other part of body. (Table 4)

Table 4: Various causes of infection causing pruritus in pregnancy

Infection	Presentation	Number of subjects	Percentage (%)
Fungal	Tinea	38	17.4
	Candida	17	7.8
Bacterial	Bacterial Vaginosis	10	4.6
	Furuncle	2	0.9
Viral	Warts (HPV)	5	2.3
	herpes zoster	1	0.5
	Chickenpox	2	0.9
	HSV	8	3.7
Parasitic	Scabies	18	8.3
	Trichomonas	5	2.3

Among genital causes of itching vaginal candidiasis was the most common cause Preterm delivery was seen in 5(29.4%) subjects of candida, Premature rupture of membrane (PROM) was seen in 1(5.8%), preterm premature rupture of membrane (PPROM) was seen in 4(23.5%) subjects in candida. in 3 cases of genital HPV infection there were extensive warts on genital area so in them LSCS was done due to distorted anatomy or for prevention of infection to fetus. (Table 5)

Table 5: Maternal outcomes in various infectious causes of Pruritus

Infectious Causes	Preterm delivery (<37weeks)	Term PROM	PPROM	Oligo-hydramnios	Puerperal sepsis
Candida vaginalis (n=17)	5(29.4)	1(5.8%)	4(23.5%)	-	-
Bacterial vaginosis (n=10)	3(30%)	2(20%)	3(30%)	1(10%)	1(10%)
Trichomonas (n=5)	2(40%)	2(40%)	1(20%)	-	-
Tinea (n=38)	2(5.2%)	-	-	-	-
Furuncle (n=2)	-	-	-	-	-
Warts (HPV) (n=5)	-	-	-	-	-
Herpes zoster (n=1)	-	-	-	-	-
HSV (n=8)	1(12.5)	-	-	-	-
Chicken pox (n=2)	-	-	-	-	-
Scabies (n=18)	-	-	-	-	-

In vaginal candidiasis, 6(35.3%) subject babies had prematurity and NICU admission was seen in baby of 6(35.3%) subjects. In rest of infectious causes like HPV, Chicken pox, herpes zoster, scabies and tenia no adverse effect was in fetus. But 2 subjects of Tinea had prematurity and 1 need NICU admission. While 1 subject of HSV has prematurity. (Table 6)

Table 6: Fetal outcome in various infectious causes of Pruritus

	LBW	Prematurity	FGR	NICU Admission
Candida vaginalis (n=17)	1(5.9%)	6(35.3%)	1(5.9%)	6(35.3%)
Bacterial vaginosis (n=10)	3(30%)	3(30%)	2(20%)	4(40%)
Trichomonas (n=5)	-	-	1(20%)	3(60%)
Tinea (n=38)	-	2(5.2%)	-	1(2.6%)
Furuncle (n=2)	-	-	-	-
Warts (n=5)	-	-	-	-
Herpes zoster (n=1)	-	-	-	-
HSV (n=8)	-	1(12.5%)	-	1(12.5%)
Chicken pox (n=2)	-	-	-	-
Scabies (n=18)	-	-	-	-

Fig No. 2: Scabies

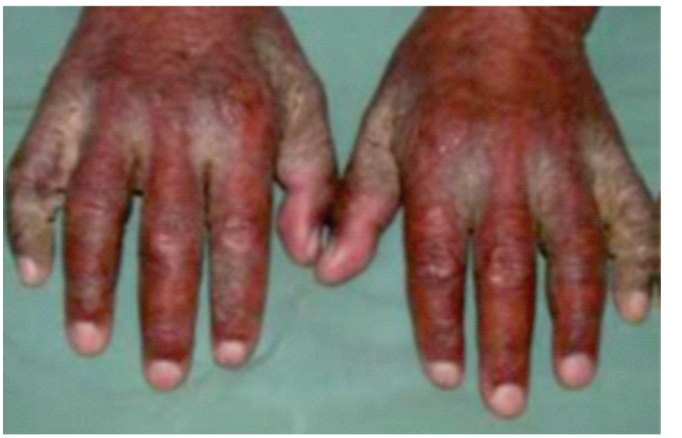


Fig No. 3: Tinea

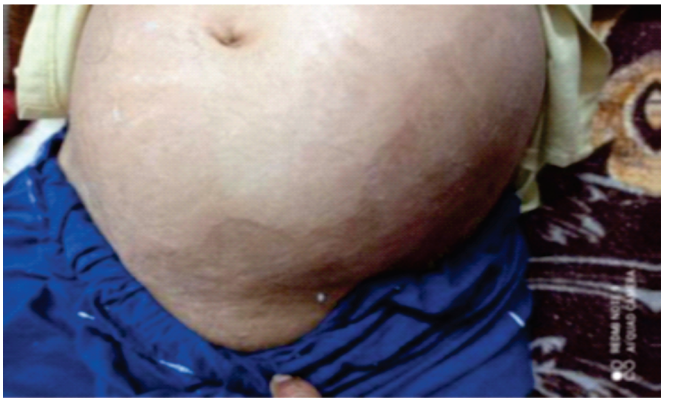
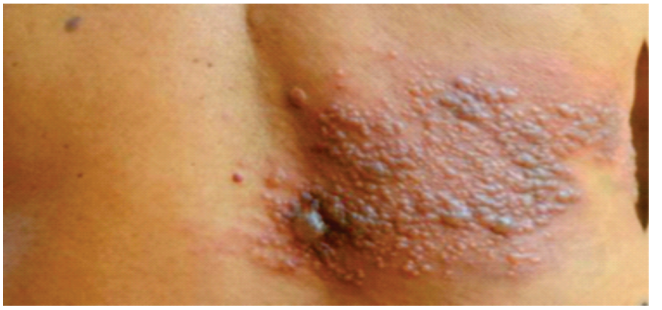


Fig No. 4: Herpes Zoster at back of patient



DISCUSSION

This was an observational prospective study for period of 1 year in which 218 antenatal patients who presented with complaint of pruritus were observed.

In our study age group of the subject ranged from 18-41 years with an average age of 30.2 ± 4.20 years while in study done by Chopra D et al [5], age ranged from 18-40 years with an average age of 24.2 ± 3.53 years. The onset of pruritus ranges between earliest as 11wk3d and late as 38 wk2d and mean gestational age of onset of pruritus was 25.6+/- 4.6 week of gestation. It was comparable to study by author Ayanlowo OO et al [6].

In present study 113 (51.8%) cases were primigravida, multigravida was 105 (48.2%), whereas which was similar to the study done by Chopra D et al [5] number of 115(57.5%) were primigravida while 85(42.5%). However, in the study done by Justyna Szczech et al [7], 184(63.0%) were primipara and 108(37.0%) were multipara.

The majority of subjects in our study had moderate intensity of pruritus measured by VRS. This was in concordance with study done by Szczech J et al [7] in which majority of subjects has moderate intensity of pruritus(n=26,44.1%), 17(28.8%) mild intensity, 8(13.6%) very mild intensity, 7(11.9%) has severe, and 1(1.7%) has very severe intensity. The most common type of sensation felt in our study was tickling in 119(54.6%) which was comparable to study conducted by Szczech J et al [7], in which the most common type itch related sensation was tickling in 31(52.5%) cases.

Most common site of pruritus was over abdomen and chest seen in 153(70.2%) in our study. This was in concordance with study conducted by Justyna Szczech et al [7], in which most common site of pruritus was over abdomen and chest in 52(88.1%), followed by hand seen in 25(42.4%) and lower limb and feet in 24(40.7%) subjects. In our study genital pruritus was seen in 45(20.6%) subjects while in study conducted by Chopra D et al. [5] Number of subjects with genital pruritus was 23(11.5%) and generalized pruritus was seen in 112(56%). In our study among infection tinea being the most common infection seen in 38(17.4%) subjects followed by scabies 18(8.3%), and candida 17(7.8%), this was in concordance with Chopra D et al. [5] study in which tinea was most common infection seen in 24(12%) cases and next common infection was warts seen in 22(11%) followed by candida in 20(10%) cases. While in study done by Kannambal K.et al [8] candidiasis was the most common infection.

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Preterm delivery occurred in 5(29.4%), PROM occurred in 1(5.8%) and PPROM in 4(23.5%) out of 17 cases of vaginal candidiasis and no subject has oligohydramnios or puerperal sepsis. It was similar to the study by Rathod S et al [9] where preterm delivery occurred in 11(28.9%), PROM in 3(7.89%), PPROM in 6(15.8%), oligohydramnios in 1(2.63%) and puerperal sepsis in 4(10.5%).

In our study in candida infection Low Birth Weight (LBW) and IUGR was seen in 1(5.9%) each, prematurity in 6(35.3%), and NICU admission in 6 (35.3%), no still birth was seen out of 17 causes of candida infection. This was in concordance with study done by Rathod S et al [9]. But in this study, still birth was also seen in 6(15.8%) LBW and FGR was seen in 3(7.9%) each, 2(5.3%) had prematurity, 16(15.8%) required NICU admission out of 38 cases of candida.

In study done by Dawood AS et al [10] incidence of preterm labor was seen in 33(16.75%), PROM was noticed in 60(30.4%) while in our study preterm was

seen in 9(28.1%) subjects of vaginitis and PROM was 5(15.6%).

In our study, no abortion, preterm delivery, no need of NICU admission, no FGR or still birth was observed in subjects infected with scabies, Tinea or HPV infection. No congenital malformation or preterm delivery was noted in subjects infected with Chicken pox or herpes zoster infection.

CONCLUSION

This study highlights the various causes of pruritus in pregnancy. Infection contributes the major cause of pruritus in pregnancy followed by specific dermatoses in pregnancy. Most common site of pruritus is abdomen and it most commonly occurs during evening. Pruritus can have adverse maternal and fetal outcome. In mother pruritus can cause sleep disturbance and affect quality of life. Among infectious causes like candida vaginalis, bacterial vaginosis and trichomonas can cause preterm delivery, PROM, PPROM, oligohydramnios and LBW babies. Chicken pox in early trimester can cause congenital varicella syndrome. HSV, Tinea and scabies present with no maternal or fetal risk. Thus, awareness and recognition of these infections and familiarity with their treatment and outcome is important. Early diagnosis and prompt treatment can improve maternal and fetal prognosis and can decrease morbidity.

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Original Research Article

ANTIMICROBIAL PROFILES OF UROPATHOGENS IN A TERTIARY CARE HOSPITAL OF NORTHWESTERN INDIA

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Absract

Background: Urinary tract infections (UTIs) are extensively studied due to their high prevalence and potential severity, particularly concerning antimicrobial properties.. This study aimed to evaluate the prevalence of common uropathogens and their antimicrobial resistance.

Method: A prospective cross-sectional study was conducted on a total of 16,077 urine samples at a tertiary care hospital in Patiala, Punjab, from January 2022 to December 2022 using standardized microbiological methods. The isolated microorganisms underwent antibiotic resistance testing using the Kirby-Bauer disk diffusion method.

Results: A total of 16,077 urine samples were analyzed, among gram negative microorganism Esch.coli (n=1962) was the most prevalent microorganism, followed by Klebsiellapneumoniae (n=722), Pseudomonas aeruginosa (n=572), Acinetobacter Baumanni Complex(451), Citrobacter species (n=132), Proteus spp. (n=96), and Enterobacter spp. (n=12). Among gram positive Enterococcus spp. (n=786) was most prevalent followed by Staphylococcus aureus (n=420), MRSA (n=30), Antibiotic profile data revealed that gram negative have high resistance rates towards Ampicillin, Ciprofloxacinand Amoxicillin-clavulanateand among gram positive resistance rate was higher in Ampicillin, Ciprofloxacin Amoxicillin-clavulanate, Gentamicin, Levofloxacin, Erythromycin and Netilmicin.

Conclusion: Esch. coli and Enterococcus spp. emerged as the predominant uropathogen, exhibiting a high level of antibiotic resistance against various antibiotics.

Keywords: Antibiotic resistance; Urinary tract infections; Uropathogens; gram negative;gram positive; Healthcare-associated infections

Introduction:

Urinary tract infection (UTI) stands as the most prevalent bacterial infection, contributing to 25.0% of all reported infections [1]. It constitutes a significant cause of morbidity and ranks as the second most frequent reason for hospital visits. Approximately 35% of healthy women experience UTI symptoms at some point in their lives [2]. Esch.coli, a part of the normal bowel flora, is the primary causative agent, accounting for over 75% of UTI cases [3]. Esch.coliis increasingly implicated in both community-acquired and hospital-acquired infections, facilitated by its ability to bind selectively to uroepithelial cells using P fimbrine [4]. UTIs present with symptoms such as fatigue, dysuria, urgency of urine, and urinary tract irritation. Prolonged hospital stay and indiscriminate antibiotic usage are the risk factors [5]. Other pathogens such as Gram-negative Enterobacteriaceae, Gram-positive Enterococcus faecalis, and Staphylococcus saprophyticus contribute to the remaining UTI cases. Although UTI affects both genders, it is more prevalent in women due to their shorter urethra and its proximity to the anus, with exceptions observed in

older men above the age of 60 with prostatic hypertrophy [6].

UTIs associated with Esch. coli lead to significant morbidity and long-term consequences, affecting approximately 10% of individuals globally [7]. These infections can manifest as asymptomatic or symptomatic, posing a substantial health burden. However, the effectiveness of antibiotics in controlling these infections is diminishing due to the widespread resistance of bacterial uropathogens to various antibiotics. Early detection of antibiotic resistance and the formulation of appropriate antibiotic policies are crucial for effective management in tertiary care settings [8].

Given the geographic variability in the prevalence of resistance strains, understanding the current levels of antimicrobial resistance among common urinary pathogens is essential [9]. Establishing institutional antibiotic policies can assist clinicians in selecting the most appropriate treatment strategies [10]. Therefore, this study aimed to investigate the prevalence and antibiotic sensitivity patterns of uropathogens in urine samples, with the findings intended to inform antibiotic policies and control measures.

Material and Methods:

A retrospective cross-sectional study was conducted in the Department of Microbiology in a tertiary care hospital in Patiala from January 2022 to December 2022. A total of 16,077 urine samples were processed, including 577 samples from the ICU, 7500 samples from the outpatient unit, and 8000 samples from the inpatient unit. The conventional loop method, a semi-quantitative technique, was used to cultivate urine. The organisms isolated from urine culture were identified by standard methods1. The antibiotic sensitivity test was done on Mueller-Hinton agar by Kirby-Bauer disc diffusion test as per Clinical and Laboratory Standard Institute (CLSI) guidelines8. Antibiotics used for gram negative organism were Ampicillin (10µg), Amikacin (30µg), Gentamic in (10µg), Ciprofloxacin (5µg), Levofloxac in (5µg) Ofloxacin (5µg), Norfloxacin (10µg), Ceftazidime (30µg), Cefotaxime (30µg), Ceftriaxone (30µg), Cefepime (30µg), Piperacillin- Tazobactum (100/10µg), Nitrofurantoin (300µg), Cotrimoxazole (25µg), Imipenem (10µg), Meropenem (10µg. For gram positive microorganism Ampicillin (10µg), Amoxycillin (30 µg), Amoxy-Clav (20/10µg), Erythromycin (15µg), Clindamycin (2µg), Netilmicin (30µg), Linezolid (30µg) and Vancomycin (30µg) antibiotics were used.If an isolate was discovered to be resistant to three or more antibiotics from various classes or groups of antibiotics, it was deemed multidrug resistant (MDR). Bacterial isolates were identified using standard microbiological protocols, and antibiotic susceptibility testing was performed using the Kirby-Bauer disk diffusion method. Various antibiotics were tested, and zone sizes were interpreted based on established criteria.

Results: The findings presents the distribution of various bacterial species isolated from clinical samples, highlighting their prevalence and contribution to microbial infections. Understanding the prevalence of these organisms is essential for effective clinical management and antimicrobial stewardship programs. Table 1 in the current data indicated that among the 16,077 urine samples analyzed, a notable 32.23% (5183 samples) were culture positive. Among gram negative microorganism the study identified Esch. colias the most prevalent organism with 1962 isolates (37.86%), followed by the second most prevalent Klebsiella pneumonia with 722 isolates (13.93%,), Pseudomonas aeruginosa with 572 isolates (11.03%), Acinetobacterbaumanni complex with 451 isolates (8.70%,), and among gram positive microorganism Enterococcus spp., with 786 isolates (15.17%) was found to be most prevalent followed by Staphylococcus aureus with 420 isolates (8.10%). The less prevalent organisms isolated from urine samples were Citrobactersppwith 132 isolates (2.55%), followed by Proteus spp. with 96 isolates (1.85%), andEnterobacterspp 12 isolates (0.23%) among gram negative microorganism and MRSA with 30 isolates (0.58%) among gram positive microorganism as shown in Table 1 and Figure 1.

Organism	Gram staining	Number
E. Coli	Gram negative microorganism	1962
Kiebsiella Pneumonia	Gram negative microorganism	722
Pseudomonas Aerogenosa	Gram negative microorganism	572
AcinetobacterBaumanni Complex	Gram negative microorganism	451
Citrobacter Species	Gram negative microorganism	132
Proteus Spp	Gram negative microorganism	96
EnterobacterSpp	Gram negative microorganism	12
Enterococcus Spp	Gram positive microorganism	786
Staphylococcus Aureus	Gram positive microorganism	420
MRSA	Gram positive microorganism	30
Total		**5183**

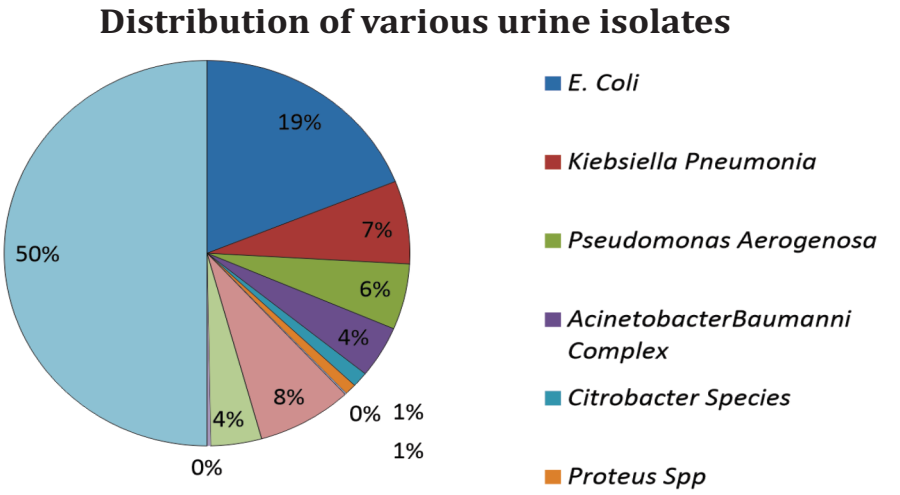

Figure 1: Distribution of various urine isolates Among the total cases, 5,233 (32.55%) were from male patients, and 10,844 (67.45%) were from female patients (Figure 2).

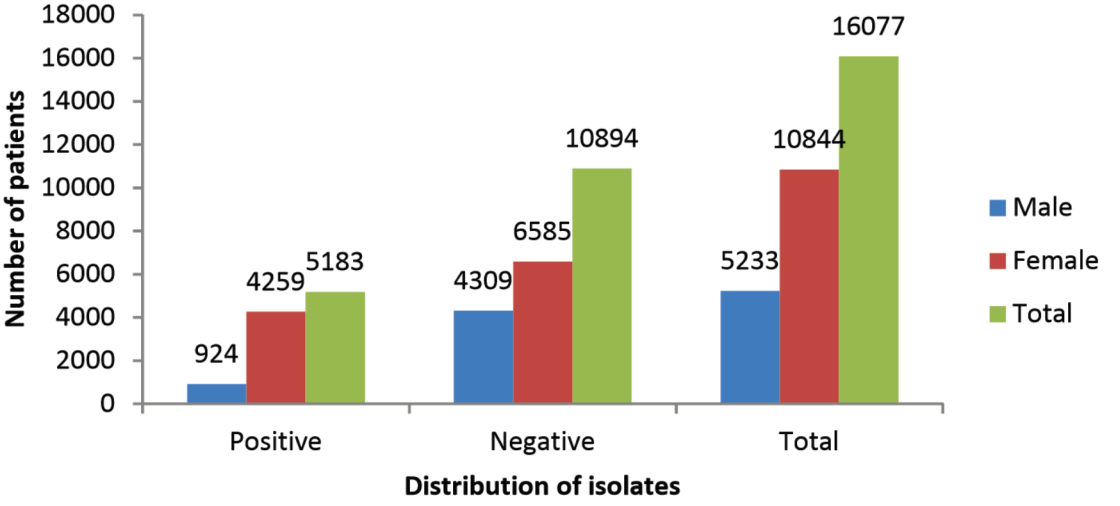

Figure 2: Gender wise distribution of culture positive cases among the study population (n=16,077) Out of 5183 culture positive cases , urinary tract infection was more common in the age group 20-40 years (n=2825) 55%, followed by 40- 60 years (n=1268) 24.5%, above 60 years (n=951) 18.3% and the age group 0-20 years (n=139) 2.7% . Additionally, females tend to have a higher prevalence of UTIs across all age groups compared to males (Figure 3).

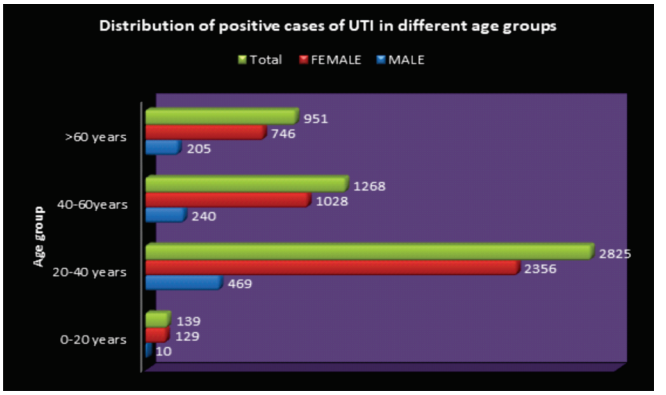

Figure 3: Distribution of positive cases of UTI in different age groups (n=5183)

Table 2 presents data on the antimicrobial sensitivity patterns of Gram-negative isolates obtained from urine samples, categorized by different antibiotics and bacterial species. Among gram negative bacteria, Esch.coli and Klebsiellapneumoniae showed high sensitivity towards Imipenem (100%), Meropenem, Nitrofurantoin (83%) and Amikacin (80%). However, it displayed lower sensitivity to Ampicillin, Ciprofloxacin and Amoxicillin-clavulanate, with sensitivities ranging from 7.2% and 20%.

Table 2: Antimicrobial Sensitivity Pattern of Gram Negative Isolates from Urine samples

Antibiotic	***Esch. coli***	***Kiebsiella Pneumonia***	***Pseudomonas Aerogenosa***	***Acinetobacter Baumanni Complex***	***Citrobacter Species***	***Proteus Spp***	***Enterobacter Spp***
Ampicillin	141 (7.2%)	43 (5.9%)	291 (51%)	nil	17 (13%)	4 (5.2%)	5 (44%)
Amoxy–clav	372 (19%)	238 (33%)	297 (52%)	nil	19 (15%)	10 (10.5%)	nil
Amikacin	1569 (80%)	599 (83%)	160 (28%)	293 (65%)	81 (62%)	92 (96%)	nil
Gentamicin	902 (46%)	353 (49%)	228 (40%)	nil	67 (51%)	85 (89%)	9 (78%)
Ciprofloxacin	392(20%)	180(25%)	200 (35%)	nil	76 (58%)	81 (85%)	9 (75%)
Levofloxacin	1020 (52%)	231 (32%)	211 (37%)	nil	79 (60%)	43 (45%)	4 (38%)
Ofloxacin	1079 (55%)	209 (29%)	286 (50%)	nil	80 (61%)	39 (41%)	4 (38%)
Norfloxacin	824 (42%)	325 (45%)	314 (55%)	nil	75 (57%)	55 (58%)	5 (41%)
Cefatzidime	1039 (53%)	361 (50%)	280 (49%)	nil	72 (55%)	57 (60%)	4 (38%)
Cefuroxime	961 (49%)	339 (47%)	291 (51%)	202 (45%)	79 (60%)	51 (54%)	6 (45%)
Cefotaxime	1059 (54%)	368 (51%)	303 (53%)	189 (42%)	76 (58%)	47 (49%)	7 (58%)
Ceftrioxane	981 (50%)	353 (49%)	308 (54%)	193 (43%)	85 (65%)	52 (55%)	6 (45%)
Cefepime	nd	nd	572 (100%)	nd	nd	nd	6 (45%)
Piperacillin+ Tazobactem	1138 (58%)	563 (78%)	480 (84%)	nd	112 (85%)	81 (85%)	8 (65%)
Nitrofurantoin	1628 (83%)	577 (80%)	Nd	nd	116 (88%)	nd	nd
Cotrimoxazole	412 (21%)	223 (31%)	Nil	nd	39 (30%)	9 (10.2%)	nil
Imipenem	1962 (100%)	722 (100%)	572 (100%)	451 (100%)	132 (100%)	96 (100%)	11 (89%)
Meropenem	1962 (100%)	722 (100%)	573 (100%)	452 (100%)	133 (100%)	97 (100%)	10 (85%)

In contrast, Pseudomonas aeruginosa showed lower sensitivity to some antibiotics like Amikacin (28%), Ciprofloxacin (35%), Levofloxacin (37%),Gentamicin (40%) and Cefatzidime (49%). It showed high sensitive towards Imipenem (100%), Meropenem (100%) and Piperacillin-tazobactam (84%). Acinetobacterbaumannii complex displays mixed sensitivity patterns, with notable susceptibility to Amikacin, Ciprofloxacin, Piperacillin-tazobactam, Imipenem, and Meropenem ranging from 40% to 65%. Citrobacterspp. and Enterobacter spp. show moderate to high sensitivity to Piperacillin-tazobactam, Nitrofurantoin, Imipenem, and Meropenem ranging from 80% to 100%, while resistance is observed against Ampicillin and Amoxicillin-clavulanate, with variable susceptibility to certain Cephalosporins.Proteus spp. exhibits moderate to high sensitivity to Amikacin, Ciprofloxacin, Gentamicin, Piperacillin-tazobactam, Imipenem, and Meropenem. However, resistance rates against Ampicillin, Amoxicillin-clavulanateand Cotrimoxazole are significant. The overall moderate sensitivity of all gram negative isolates was shown towards Norfloxacin, Cefuroxime, cefotaxime and ceftrioxane ranging from 40% to 60%.

Table 3: Antimicrobial Sensitivity Pattern of Gram positive Isolates from Urine samples.

Antibiotic	***Enterococcus Spp***	***Staphylococcus Aureus***	***MRSA***
Ampicillin	440 (56%)	235 (56%)	nil
Amoxy–clav	354 (45%)	218 (52%)	8 (28%)
Amikacin	252 (32%)	201 (48%)	23 (78%)
Gentamicin	385 (49%)	nil	6 (20%)
Ciprofloxacin	110 (14%)	nil	nil
Netilmicin	432 (55%)	210 (50%)	10 (35%)
Erythromycin	463 (59%)	201 (48%)	9 (30%)
Cefepime	Nd	nd	nd
Nitrofurantoin	628 (80%)	252 (60%)	21 (70%)
Clindamycin	526 (67%)	247 (59%)	nd
Linzeolid	754 (98%)	390 (93%)	25 (85%)
Vancomycin	786 (96%)	399 (95%)	26 (88%)

Table 3 provides the antimicrobial sensitivity pattern of Gram-positive bacterial isolates obtained from urine samples. Enterococcus spp. exhibits moderate (40% to 60%) to high (80% to 100%) sensitivity to several antibiotics, with notable susceptibility to Amikacin, Amoxy-clav, Erythromycin, Netilmicin, Gentamicin, Levofloxacin, Nitrofurantoin, Linzeolid, Vancomycinand Teicoplanin. Resistance is observed against Ampicillin and Ciprofloxacin. Staphylococcus aureus shows high sensitivity to Nitrofurantoin (60%), Linzeolid (93%)and Vancomycin. (95%), Complete resistance was observed against Ciprofloxacin, Gentamicin while moderate resistance was observed against Erythromycin (48%) and Amikacin (48%). MRSA (Methicillin-Resistant Staphylococcus aureus) exhibits reduced sensitivity to many antibiotics compared to Staphylococcus aureus. It showed susceptibility to Amikacin (78%), Nitrofurantoin (70%), Linzeolid (85%), and Vancomycin (88%). Resistance rates of gram positive

microorganism against Ampicillin, ciprofloxacin, Amoxicillin-clavulanate, Gentamicin, Levofloxacin, Erythromycin and Netilmicin are high.

Discussion:

In the present study, bacterial isolates obtained from urine samples were analyzed to investigate their antibiotic susceptibility patterns in Northwest India. Our findings are consistent with previous research, which consistently identifies Escherichia coli as the predominant pathogen responsible for urinary tract infections (UTIs) in both hospital settings and the general population [11]. In a study conducted in eastern Nepal also reported a high incidence of Esch. coli (53.57%), Klebsiella spp(14.29%) and Enterococcus (11.90%) [12]. Moreover, a study conducted in southern India found similar results, with Esch. coli being the most prevalent pathogen causing UTIs, followed by Klebsiella pneumoniae and Enterococcus species [13]. In North India, a study conducted in Delhi reported Escherichia coli as the predominant pathogen causing UTIs, followed by Klebsiella pneumoniae and Enterococcus species [14]. Similarly, a study in Punjab found Esch. coli to be the most common pathogen associated with UTIs, corroborating our findings [15].

The present study unveiled that middle-aged female patients demonstrated elevated rates of Esch. coli infections in the urinary tract compared to male patients. This observation mirrors findings from Mumbai, where a notable proportion of middle-aged female patients were diagnosed with bacterial infections compared to their male counterparts. Similar patterns were identified in studies conducted at Aligarh University and in Bangladesh [16-18].

Additionally, research conducted in other regions has also reported similar trends in gender-specific prevalence of Esch. coli infections. A study conducted in Karachi, Pakistan, found a higher incidence of urinary tract infections caused by Esch. coli among middle-aged women as compared to men [19]. Similarly, in a study conducted in Sri Lanka reported a higher prevalence of Esch. coli urinary tract infections among females, particularly in the middle-aged group [20]. Furthermore, a study in Nigeria found a higher prevalence of Esch. coli urinary tract infections in women aged 40-60 years compared to men in the same age group [21].

These studies collectively reinforce the observed gender-specific differences in the prevalence of Esch. coli infections in the urinary tract, particularly among middle-aged women, and highlight the need for targeted interventions in this demographic group.

The antimicrobial sensitivity profiles among Gram-negative bacteria provide crucial insights into the evolving landscape of antimicrobial resistance (AMR) and therapeutic options. In concordance with previous studies, Esch.coliand Klebsiellapneumoniae exhibited pronounced susceptibility to carbapenems like Imipenem and Meropenem, underlining the continued efficacy of these agents against Enterobacteriaceae [22, 23]. Similar findings regarding the high rates of antibiotic resistance in Esch.coli have been reported in various regions of India, reflecting a concerning trend of increasing antimicrobial resistance among bacterial pathogens nationwide. For instance, a study conducted in Pondicherry, South India, highlighted the prevalence of multidrug-resistant Escherichia coli isolates [24]. However, the documented decline in susceptibility to conventional antibiotics like Ampicillin, Ciprofloxacin, and Amoxicillin-clavulanate underscores the pressing need for judicious antimicrobial prescribing practices to mitigate the development of resistance [25, 26]. A study by Kapoor et al. demonstrated high rates of resistance among Gram-negative bacteria, including Esch. coliand Klebsiella pneumoniae, to commonly prescribed antibiotics such as Ampicillin, Ciprofloxacin, and third-generation cephalosporins [27]. Similarly, a retrospective analysis by Mendiratta et al. revealed increasing resistance trends among Pseudomonas aeruginosa isolates, emphasizing the need for judicious antimicrobial prescribing practices and infection control measures conversely, the variable susceptibility patterns observed in Pseudomonas aeruginosa underscore its adaptability, necessitating tailored treatment strategies guided by species-specific susceptibility data [28, 29]. Furthermore, the emergence of mixed sensitivity profiles in Acinetobacter baumannii

complex emphasizes the multifaceted challenges associated with managing infections caused by this pathogen, urging the exploration of alternative treatment modalities [30, 31].

Among gram positive organism, the present study has corroborated with global trends, demonstrating moderate to high sensitivity of Enterococcus spp. to various antibiotics, including Ciprofloxacin, Levofloxacin, and Nitrofurantoin [32, 33]. Similarly, Staphylococcus aureus exhibited susceptibility to certain antibiotics, notably Piperacillin-tazobactam and carbapenems, consistent with international findings [34, 35, 36]. Nonetheless, the emergence of Methicillin-Resistant Staphylococcus aureus (MRSA) poses significant challenges, with reduced sensitivity to multiple antibiotics, necessitating the exploration of alternative treatment modalities [37].

Conclusion: Our study reaffirms that Esch. coli remain the predominant pathogen responsible for infections across both urban and rural populations. Notably, we identified substantial rates of resistance to commonly prescribed antibiotics among urinary pathogens, signaling a worrisome trend of antimicrobial resistance (AMR) in community settings throughout India. The findings emphasize the urgent need for ongoing surveillance of culture and sensitivity patterns, alongside concerted efforts in community awareness programs. These initiatives are essential for informing and guiding appropriate treatment strategies amidst the escalating challenge of bacterial resistance to multiple drugs.

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Original Research Article

TO COMPARE THE DELINEATION OF FETAL BRAIN LAMINATION BETWEEN T2-WEIGHTED SINGLE-SHOT FAST SPIN ECHO AND ECHO PLANAR IMAGING FLUID- ATTENUATED INVERSION RECOVERY IMAGES--A CROSS-SECTIONAL STUDY

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Absract

The human cerebrum undergoes age-specific lamination changes during development. Notably, the subplate zone stands out as the most significant transient area, where major afferent systems temporarily settle, form synapses, and engage in essential cellular interactions critical for future cortical development. Our research utilized magnetic resonance imaging (MRI) to track the developmental history of this key cortical layer (the subplate zone) and other laminar regions of the fetal cerebral wall from 26 to 32 weeks post-ovulation. The study revealed that alterations in the MRI lamination pattern of the fetal cerebral wall are largely attributed to changes in the subplate zone. This zone is vital for creating important connections between the thalamus and cortex, coinciding with the period when the cortical mantle starts forming sulci and gyri. The present study was conducted on 50 patients and focused on the comparison of fetal brain lamination (Subplate) between T2-weighted SSFSE and EPI-FLAIR sequences to help guide the decision on the utilization of neuroimaging in the diagnostic workup referred to the Radiodiagnosis Department in Government Rajindra Hospital, Patiala.

INTRODUCTION

The subplate zone, along with the marginal zone and cortical plate, forms the foundational structure of the mammalian cerebral cortex in fetuses. Ivica Kostović and Mark E. Molliver first identified the subplate as a distinct transient fetal zone in 1974[1]. This transient structure is crucial for normal cortical development. In the developing human brain, three primary layers are evident in the cerebral wall: the ventricular zone or germinal layer next to the ventricles, which generates neuronal and glial progenitor cells; the intermediate zone or fetal white matter; and the outer developing cortex. Migratory neuroblasts initially exit the ventricular zone via somal translocation to create the preplate, a two-layered structure comprising the outer marginal zone below the pial surface and the inner subplate where most early-generated cells reside. The cortical plate develops within these layers. While the subplate is a temporary structure, the marginal zone remains into adulthood as layer 1 of the cortex. Subplate neurons are among the earliest postmitotic neurons of the cortex, forming before the cortical plate. Most of these neurons undergo programmed cell death before birth, although there is growing evidence of their extended survival into postnatal life.

The subplate's presence is essential for normal corticogenesis. Its existence below the layered cortical plate is a key indicator of cortical immaturity during the preterm phase. Initially, the subplate is quite thick and distinguishable from the cortical plate due to its significantly lower MRI signal intensity It is stated in the Policies, Guidelines, and Recommendations for MR Imaging Safety and Patient Management issued by the Safety Committee of the Society for Magnetic Resonance Imaging in 1991 that —MRI may be used in pregnant women if other nonionizing forms of diagnostic imaging are

inadequate or if the examination provides important information that would otherwise require exposure to ionizing radiation.‖[2] While the cortical plate (CP), or future cortex, is easily identifiable, MRI evaluation of other brain layers is challenging due to poor T2 contrast between the subplate and the underlying intermediate zone (IZ), which become indistinguishable after 24-26 weeks of gestation. Cortical tissues are marked by decreased water content and increased cell density, resulting in decreased signals on T2-weighted images and increased signals on T1-weighted images. The germinal ventricular zone and cortical plate appear as low signal intensity bands on T2-weighted images and high signal intensity bands on T1-weighted images. Compared to standard fetal T2-weighted single-shot fast spin-echo (SSFSE) sequences, echo planar imaging (EPI) fluid-attenuated inversion recovery (FLAIR) sequences provide a more reliable differentiation of fetal brain tissue compartments. The EPI-FLAIR sequence distinctly identifies the subplate from the intermediate zone throughout gestation (18–38 weeks), enhancing contrast in all brain regions compared to T2-weighted SSFSE (mean signal intensity ratio between subplate and intermediate zone). Fetal MRI is a well-established method for assessing and ruling out fetal central nervous system pathologies, particularly in the brain parenchyma. Early MRI machines often caused claustrophobia, but recent advancements have made them much more comfortable for patients. In vivo, fetal MRI offers detailed insights into brain structure, correlates with functional maturation, and aids in the early detection of brain damage.

AIMS AND OBJECTIVES

1. To study the fetal cortical subplate in normal pregnancies.
2. Comparison of T2WI-SSFSE and EPI-FLAIR sequences for subplate layer visualization in the fetal brain.

MATERIALS AND METHODS SOURCE AND METHOD OF COLLECTION OF DATA

The main source of the study was patients from Rajindra Hospital Patiala. The pregnant females (26-32 weeks) who were coming for routine Antenatal checkups from the Department of Obstetrics and Gynaecology. A minimum of 50 cases were intended to be taken up for study to derive a significant result and statistical analysis.

Study Design:

Cross sectional study. Inclusion Criteria: Singleton pregnancy (26-32 weeks) Exclusion Criteria: 1. Unknown gestational age (GA) 2. Any Congenital Malformations and multiple gestation

METHODOLOGY:

This study was conducted on 50 pregnant females (26-32 weeks) who are coming for routine ultrasound examination in department of Radiodiagnosis, Government Medical College and Rajindra Hospital, Patiala. An informed and written consent was obtained from all patients before enrollment. The patients were referred to Department of Radiodiagnosis from Obstetrics and Gynaecology department of Government Medical College and Rajindra Hospital, Patiala for routine ultrasound examination. EQUIPMENT: The study was performed on Siemens magnetom aera 1.5T MRI machine. STUDY ANALYSIS: Descriptive studies were presented in terms of mean and standard deviation. Qualitative data were presented as frequency multivariate analysis. Other sub stratified analysis were carried out as appropriate.

OBSERVATIONS

This cross-sectional study was carried out on 50 pregnant females(aged 18-38 years) coming for routine ultrasound examination to the department of Radiodiagnosis, Government Medical College and Rajindra Hospital, Patiala. They were subjected to an MRI examination. The observations were as under:-

The gestational age range included in our study was from 26 weeks 32 weeks. The maximum number of patients (pregnant mothers) were in the gestational age of 26-27 weeks (44%). The second-highest number of patients were in the gestational age of 31 weeks-32 weeks (16%). The mean gestational age of the patients in our study was 28.17±2.05.

TABLE-1

Comparison of Subplate visualization between T2-SSFSE and EPI-FLAIR sequence

		26^{+0} – 26^{+6} Weeks			27^{+0} – 27^{+6} Weeks			28^{+0} – 28^{+6} Weeks			29^{+0} – 29^{+6} Weeks			30^{+0} – 30^{+6} Weeks			31^{+0} – 31^{+6} Weeks			32^{+0} – 32^{+6} Weeks		
		T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value	T2-SSFSE	EPI-FLAIR	p value
Frontal Lobe	Not Visualized	11 (55%)	0 (0%)	0.007 (7.29)	7 (87.5%)	0 (0%)	0.039 (4.27)	4 (80%)	0 (0%)	0.014 (6.02)	3 (75%)	0 (0%)	0.001 (12.29)	3 (75%)	0 (0%)	0.001 (24.01)	5 (83.3%)	0 (0%)	0.009 (6.83)	3 (100%)	0 (0%)	0.025 (5.00)
	Partially Visualized	9 (45%)	2 (10%)		1 (12.5%)	3 (37.5%)		1 (20%)	2 (40%)		1 (25%)	2 (50%)		1 (25%)	3 (75%)		1 (16.7%)	4 (66.7%)		0 (0%)	3 (100%)	
	Completely Visualized	0 (0%)	18 (90%)		0 (0%)	5 (62.5%)		0 (0%)	3 (60%)		0 (0%)	2 (50%)		0 (0%)	1 (25%)		0 (0%)	2 (33.3%)		0 (0%)	0 (0%)	
Temporal Lobe	Not Visualized	11 (55%)	0 (0%)	0.007 (7.29)	6 (75%)	0 (0%)	0.015 (5.95)	3 (60%)	0 (0%)	0.007 (7.22)	3 (75%)	0 (0%)	0.001 (48.02)	3 (75%)	0 (0%)	0.001 (48.02)	3 (50%)	0 (0%)	0.001 (8.26)	2 (66.7%)	0 (0%)	0.002 (10.34)
	Partially Visualized	9 (45%)	2 (10%)		2 (25%)	1 (12.5%)		2 (40%)	2 (40%)		1 (25%)	1 (25%)		1 (25%)	1 (25%)		3 (50%)	3 (50%)		1 (33.3%)	2 (66.7%)	
	Completely Visualized	0 (0%)	18 (90%)		0 (0%)	7 (87.5%)		0 (0%)	3 (60%)		0 (0%)	3 (75%)		0 (0%)	3 (75%)		0 (0%)	3 (50%)		0 (0%)	1 (33.3%)	
Parietal lobe	Not Visualized	15 (75%)	0 (0%)	0.001 (14.3)	7 (87.5%)	0 (0%)	0.011 (6.36	3 (60%)	0 (0%)	0.057 (3.61)	2 (50%)	0 (0%)	0.002 (7.68)	2 (50%)	0 (0%)	0.006 (17.68)	4 (66.7%)	0 (0%)	0.001 (10.34)	3 (100%)	0 (0%)	0.025 (5.00)
	Partially Visualized	5 (25%)	2 (10%)		1 (12.5%)	4 (50%)		2 (40%)	3 (60%)		2 (50%)	1 (25%)		2 (50%)	3 (75%)		2 (33.3%)	4 (66.7%)		0 (0%)	3 (100%)	
	Completely Visualized	0 (0%)	18 (90%)		0 (0%)	4 (50%)		0 (0%)	2 (40%)		0 (0%)	3 (75%)		0 (0%)	1 (25%)		0 (0%)	2 (33.3%)		0 (0%)	0 (0%)	
Occipital lobe	Not Visualized	12 (60%)	0 (0%)	0.003 (8.90)	7 (87.5%)	0 (0%)	0.011 (6.36)	4 (80%)	0 (0%)	0.003 (8.60)	3 (75%)	0 (0%)	0.001 (12.29)	2 (50%)	0 (0%)	0.006 (17.68)	5 (83.3%)	0 (0%)	0.005 (7.84)	2 (66.7%)	0 (0%)	0.002 (10.34)
	Partially Visualized	8 (40%)	2 (10%)		1 (12.5%)	4 (50%)		1 (20%)	3 (60%)		1 (25%)	2 (50%)		2 (50%)	1 (25%)		1 (16.7%)	4 (66.7%)		1 (33.3%)	2 (66.7%)	
	Completely Visualized	0 (0%)	18 (90%)		0 (0%)	4 (50%)		0 (0%)	2 (40%)		0 (0%)	2 (50%)		0 (0%)	3 (75%)		0 (0%)	2 (33.3%)		0 (0%)	1 (33.3%)	

DISCUSSION

The subplate of the lateral neocortex changes dramatically during fetal development. The monolayer (presubplate) undergoes bilaminar transformation between 15 and 17 GW and in midgestation (17-23 GW), even trilaminar organization in the deep subplate, intermediate (SP proper), and superficial subplate subcompartments. In the stationary phase from 24 to 30 GW, the SP gradually loses sublamination and regresses after 37 GW. However, many SP neurons survive even into adulthood as subcortical white matter interstitial neurons.[3] The importance of subplate neuronal injury in the encephalopathy of prematurity is seen in the form of a decrease in subcortical white matter neurons, presumably subplate neurons, in infants with PVL. Subplate neuronal pathology has been suggested in various other neurological disorders, including epilepsy, autism, and schizophrenia, beyond the neonatal period also. Drug-resistant epilepsy is often accompanied by severe cortical dysplasias, in which large groups of cells are also abnormally located within the cerebral white matter.[4]

Period of gestation:- The gestational age range included in present study was from 26 weeks 32 weeks. The maximum number of patients (pregnant mothers) were in the gestational age of 26-27 weeks (44%). The second highest number of 58 patients were in the gestational age of 31 weeks-32 weeks (16%). The mean gestational age of the patients in our study was 28.17±2.05.

Overall Comparison of subplate visualization between T2-SSFSE and EPI-FLAIR sequence between 26-32 gestational weeks:- In our study, the difference of subplate visualization in all cerebral lobes between T2-SSFSE and EPI-FLAIR sequence was statistically significant from 26-32 weeks. In (26weeks 0 days-26weeks 6 days) gestational age, the p-value was 0.007 in the frontal & temporal lobe, 0.001 in the parietal lobe and 0.003 in the occipital lobe. In (27weeks 0 days-27 weeks 6 days) p-value was 0.039 in the frontal lobe, 0.015 in the temporal lobe, 0.011 in parietal and occipital lobes. In (28 weeks 0 days-28 weeks 6 days), the p-value was 0.014 in the frontal lobe, 0.007 in the temporal lobe, 0.057 in the parietal lobe and 0.003 in the occipital lobe. In (29 weeks 0 days-29 weeks 6 days), the p-value was 0.001 in frontal, temporal & occipital lobes and 0.002 in the parietal lobe. In (30 weeks 0 days-30 weeks 6 days), the p value was0.001 in frontal &temporal lobes and 0.006 in parietal &occipital lobes. In (31 weeks 0 days-31 weeks 6 days), the p-value was 0.009 in the frontal lobe, 0.001 in temporal &parietal lobes and 0.005 in the occipital lobe. In (32 weeks 0 days), the p-value was 0.025 in the frontal & parietal lobe and 0.002 in the temporal & occipital lobe.

Similar results were also observed in a study conducted by L Perkin 2007, in which they observed that subplate diameters ranged from 0 to 4.5 mm. The subplate showed a relatively constant diameter before becoming MR invisible from approximately 28 weeks gestation. After 28 weeks, a measurable subplate was seen in the occipital and frontal lobe but only in 2 and 3 fetuses, respectively. The subplate increased between 20 weeks and 35 weeks gestation ($p = 0.04$) in the temporal lobe. It remained visible throughout the range of study, only disappearing in 2 fetuses at 30 and 32.5 weeks, respectively.[5]

The results were in concordance with a study done by Lana vasung in 2016, for the Quantitative and Qualitative Analysis of Transient Fetal Compartments during Prenatal Human Brain Development. Forty-four postmortem brains of human fetuses and prematurely born infants were included. They described that the volume of SP increases with age between 13 and 30 PCW, reaching the maximum around 30 PCW in most areas of the cerebral hemisphere, occupying up to 45% of the entire telencephalic volume and being almost four times thicker than CP.[6]

The results concordance with a study conducted by J. Corbett-Detig in 2010, where twenty-one subjects were selected from the age range 20.57 to 25.86 gestational weeks (GW) calculated from the last menstrual cycle period. They show that global subplate volume increased in proportion with the supratentorial volume; the subplate remained approximately one-third of the supratentorial volume. They also found both global and regional growth in subplate thickness and a linear increase in the median and maximum subplate thickness through the waiting period. Furthermore, they found that the developing brain's posterior regions-specifically the occipital lobe, ventral occipitotemporal region and planum temporale-underwent the most statistically significant increase in subplate thickness. The thickest region was the developing somatosensory/motor cortex during this period. The subplate growth patterns reported here may be used as a baseline for comparison to abnormal fetal brain development.[7]

EPI-FLAIR enabled better visualization and delineation of the subplate, as determined by a qualitative assessment, with identification of the subplate (GC and SB) being significantly higher with EPI-FLAIR than with T2-weighted SSFSE (significant and highly significant p-value in all lobes between 26-32 weeks of gestation on EPI-FLAIR as comparison with T2-SSFSE in its qualitative analysis). Similar results were observed in the study conducted by Mariana C. Diogo, MD in 2019, where a total of 259 MRI examinations were included in the qualitative analysis and 72 MRI examinations were included in the quantitative analysis in which they concluded that identification of the subplate was superior on EPI-FLAIR images when compared with T2-weighted SSFSE images in all lobes (subplate visualization [complete + partial]: frontal lobe, n = 243 vs n = 117; temporal lobe, n = 244 vs n = 137; parietal lobe, n = 240 vs n = 93; occipital lobe, n = 241 vs n = 97, respectively; P, .001). On T2-weighted SSFSE images, there was consistent visualization of the subplate

until GW 26, after which only partial visualization of the subplate was possible; the subplate was then not visible after GW 35.[8]

CONCLUSION

The subplate zone, a temporary cellular compartment in the embryonic cerebrum, has grown in size and complexity throughout primate evolution, reaching its peak in humans. Understanding the normal changes in the subplate layer and the intermediate zone is crucial. This information can be used in prenatal assessments, addressing white matter injuries from ischemia or infection, and identifying abnormal white matter development associated with brain malformations. The volume of proliferative compartments significantly decreases after 25 weeks post-conception (PCW), while the extracellular matrix-rich, synapse-containing subplate compartment reaches its maximum volume and thickness around 30 PCW before diminishing again. Therefore, the optimal period for evaluating the subplate is between 26-32 weeks, as shown in our study. During mid-gestation, the subplate zone occupies nearly half of the total hemispheric volume, underscoring its importance in human brain development. A decrease in subplate neurons is linked to the development of encephalopathy in premature infants. Additionally, subplate neuronal pathology is found in various neurological disorders, including drug-resistant epilepsy, temporal lobe epilepsy, autism, and schizophrenia. Our study demonstrates that an echo-planar imaging (EPI) fluid-attenuated inversion recovery (FLAIR) MRI sequence enhances the visualization of fetal brain lamination compared to standard T2-weighted single-shot fast spin-echo sequences. Using an EPI-FLAIR sequence could also improve the in-utero detection of anomalies affecting lamination or the subplate. EPI-FLAIR sequences provide a more detailed evaluation of fetal brain maturation later in pregnancy when ultrasound imaging is limited due to skull ossification (after 30 weeks of gestation). Given its advantages and relatively short acquisition time, we recommend including this sequence in routine fetal brain MRI examinations.

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Case Report

ECTOPIC LINGUAL THYROID AS UNUSUAL CAUSE OF PROGRESSIVE DYSPHAGIA

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Abstract

Lingual thyroid gland is a rare clinical entity that is due to abnormal migration of the thyroid tissue during embryonic development. We present a case of lingual thyroid with hemi-agenesis of right lobe and colloid nodule in the left lobe presenting with difficulty in breathing and swallowing with choking episodes. Thorough clinical examination and investigations were carried out. The lingual mass was removed and sent for histopathological examination, which ultimately confirmed the diagnosis of lingual thyroid tissue. We are presenting the case for its rarity in general practice and because of its unusual presentation. The literature is reviewed regarding the incidence and diagnosis of lingual thyroid with possible treatment options discussed. The clinicians and the radiologists must be aware of this entity to avoid mistaking it for evidence of invasion by a malignant neoplasm.

Key words: Dysphagia, Lingual Thyroid, Ectopic

Introduction

Lingual thyroid is the term applied to a mass of ectopic thyroid tissue located at the base of the tongue in the mid line. This uncommon developmental anomaly may be found anywhere between the circumvallate papillae and the epiglottis. It is caused by the faulty descend of the thyroid gland through the thyroglossal duct to its normal pre-tracheal position. The presence of ectopic thyroid tissue has also been reported at other mid-line location of neck near the hyoid bone, larynx, trachea, mediastinum and oesophagus.[1] In majority of cases, there is no functional thyroid tissue in the normal cervical position. The diagnosis is usually made by the discovery of an incidental mass on the back of tongue that may enlarge and cause dysphagia, dysphonia, dyspnoea or a sensation of choking. Hypothyroidism is often present and may cause mass to enlarge and become symptomatic.[2] The choice of treatment of patients depends on various factors including size of lesion, the presence of local symptoms, the age of patients, status of thyroid gland and presence of any complication.3 Here we present a case of 17 year-old girl with mass at the base of tongue presenting with difficulty in breathing, which was excised surgically.

Case History

A 17 year-old adolescent girl presented with mass at the base of tongue with difficulty in breathing since ten years and difficulty in swallowing with occasional choking episodes (during sleep) since last one month. Her father initially noted the mass incidentally when she was seven years of age. The mass gradually increased in size but was asymptomatic until one month back when the patient started having choking spells during sleep.

The oro-pharyngeal examination revealed a hemi-spherical mass at the base of tongue. The mass was moving with deglutition. Initially a diagnosis of vallecular cyst was made. On palpation, the mass was non-tender, non-fragile and smooth. Indirect laryngoscopy was not possible because the mass was obstructing the passage. No lymphadenopathy was found in the neck. Plain radio-graph soft tissue neck lateral view showed the soft tissue shadow at the

level of base of tongue just above the epiglottis. CT scan showed the well defined hyper-dense soft tissue mass of size 2.6 x 2.4 x 2.4 cm arising in the right side of vallecula seen in the mid line at the base of tongue. Rest of oro-pharyngeal and naso-pharyngeal airway was normal. Ultra sonography of thyroid showed small left lobe with single colloid nodule in it. Right lobe of thyroid was not visualised. Radio-isotope scanning for thyroid was not performed due to economic limitation. Thyroid profile was with in normal range. The patient underwent surgery and tissue sent for histo-pathological examination.

Gross: We received mucosa covered soft tissue piece measuring 2.5 x 2.5 cm. Cut surface was brown, translucent.

Microscopy: Sections show numerous variable size thyroid follicles lined by flattened and cuboidal epithelium and filled with colloid. These follicles are present beneath the lingual mucosa and lingual lymphoid follicles (figure 1-5)

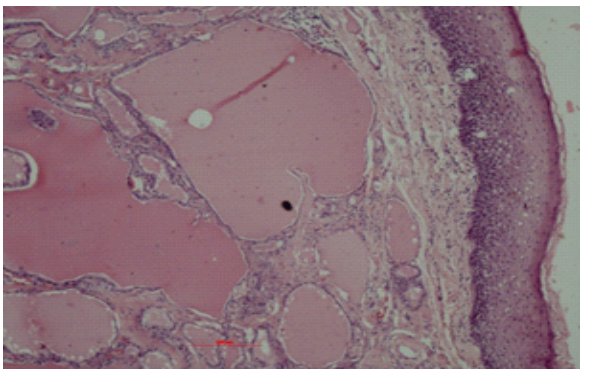

Figure 1 Haematoxyl in and eosin stained sections showing variable sized thyroid follicles beneath the lingual mucosa (Low power view)

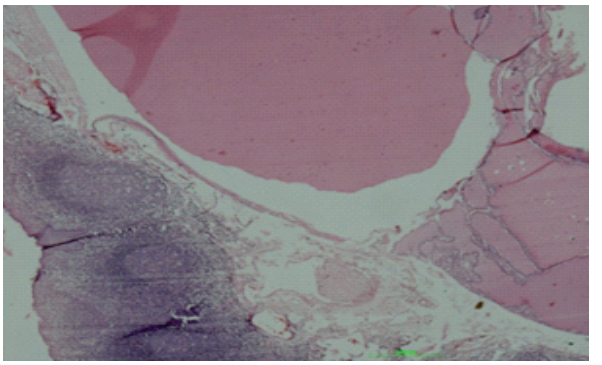

Figure 2 Haematoxyl in and eosin stained sections showing thyroid follicles beneath lingual lymphoid follicles (Low power view)

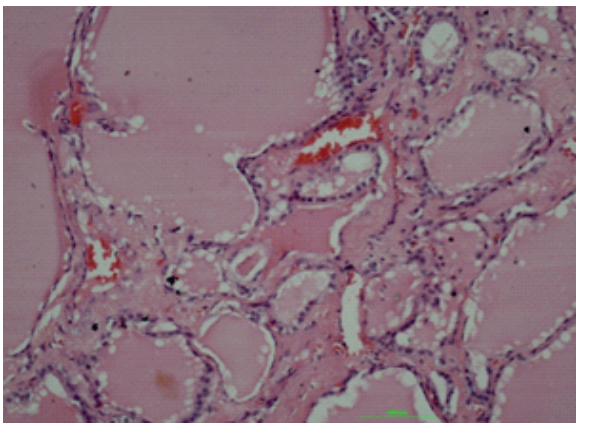

Figure 3 Haematoxyl in and eosin stained sections showing thyroid follicles lined by actively secreting epithelium and filled with colloid (High power view)

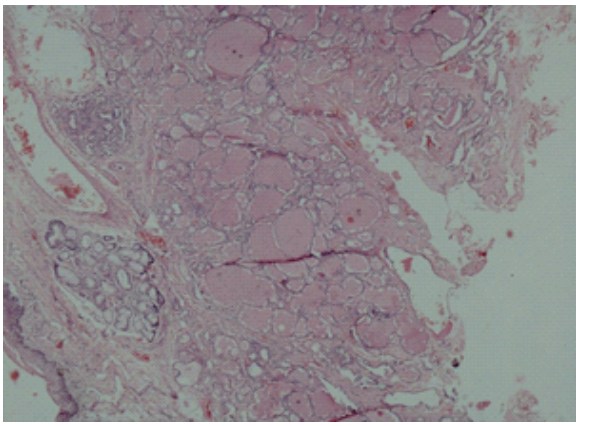

Figure 4 Haematoxyl in and eosin stained sections showing thyroid follicles and sublingual glands (Low power view)

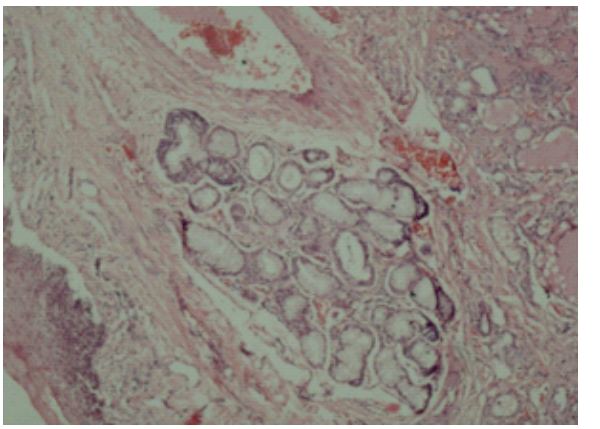

Figure 5 Haematoxyl in and eosin stained sections showing thyroid follicles and sublingual glands (High power view)

Post operative thyroid profile performed after 3 weeks of surgery showed hypothyroid hormone status.

Discussion

The thyroid primordial develops in a 3-4 mm embryo as an endodermal bud from the anterior floor of the pharynx and descends down on either side of the trachea to its pre-tracheal site where it fuses with the caudal prolongation of the fourth pharyngeal pouch to form the thyroid gland. Failure to this process results in ectopic thyroid. Arrest in descend can occur just below the foramen caecum (lingual), between the genio-hyoid and mylo-hyoid muscles(sub-lingual), or just above or below the level of hyoid bone.[4] Other rare sites are larynx, trachea, oesophagus, mediastinum and the heart.[5] Of all ectopic thyroid, 90% are found on lingual dorsum.

Lingual thyroid is a rare developmental anomaly characterised by an aggregate of thyroid tissue in the midline of the base of tongue, between the circumvallate papillae and the epiglottis.[6] The first case of lingual thyroid was reported by Hickmann, who described a 16-hour-old female infant who died of suffocation caused by a mass obstructing the oro-pharynx.[7] The incidence of lingual thyroid varies between 1:3000 and 1:100,000[8] and affected individual have no other thyroid tissue in 70% of cases. Lingual thyroid is generally found in two main age related groups: one consist of children who often suffer from developmental anomalies and mental retardation, the second group presents with the onset of symptoms of dysphagia and oro-pharyngeal obstruction before or during puberty.[9]

The pathogenesis of this condition remains unclear. It has been postulated that maternal anti-thyroid immunoglobulin may arrest the descent of the gland and predispose the patient to poor thyroid function later in the life.

The age at presentation ranged from 6 to 74 years[10] with marked preference towards females, the ratio ranging from 4:1 to 7:1.[11] The clinical evidence oh hypothyroidism is found in up to 33% of the patient.

Even though most of the lingual thyroid glands contain histologically normal, or adenomatous tissue, there are reports of carcinoma, foetal or micro-follicular adenoma arising with in the lingual thyroid.[2] Only one-third of the patients with lingual thyroid have thyroid tissue in the neck, as in the present case.

Most of the times, it is asymptomatic with small size (less than 1cm)[12] but sometimes, as in the present case, it can attain larger dimensions and cause symptoms pertaining to airway obstruction. This makes the present case extremely rare because of the associated neck thyroid mass and normal pre-operative thyroid status.

The clinical management of lingual thyroid remains somewhat controversial because of paucity of data in the literature. The best initial guide to treatment is the presence or absence of symptoms. The use of suppressive therapy with exogenous thyroid hormone is the mainstay of medical treatment. The goal of therapy is to suppress TSH and thereby remove the stimulus for gland enlargement. Surgical therapy is appropriate for patients with clinical signs of upper airway obstruction and severe dysphagia or when malignant degeneration is suspected. Ablative radiotherapy is reserved for older patients when surgical therapy is not appropriate.[1]

Conclusion

We describe the occurrence of an ectopic lingual thyroid. Although not uncommon, this possible location is worth bearing in mind as a possible developmental anomaly. Diagnosis is based on history, physical, radiographic examination, thyroid function test and finally on histo-pathological study. Management of these lesions varies in different patients. The available options in management are surgical excision or radio-iodine therapy.

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Case Report

A RARE CASE REPORT OF NON - PANCREATIC INTRA - PERITONEAL PSEUDOCYST

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Absract

Introduction:

Non-pancreatic pseudocysts are lesions usually arising from mesentery or omentum and are a rare occurrence. The internal content of these cysts could be blood, pus, serous or chylous fluid. In majority of the scenarios, causation of these cysts is related to trauma, surgery or infection. Pseudocysts related to pancreatitis occur in 5 – 15 % of patients who have peripancreatic fluid collection after an episode of acute pancreatitis. It takes at least 4 – 8 weeks for fibrotic reaction to develop and hence for the formation of cyst capsule which is composed of collagen and granulation tissue and is not lined by a true epithelial lining.

Case Presentation:

A 31 year old male presented in surgery OPD with chief complaints of gradually progressive abdominal distension associated with pain epigastrium for past 2 ½ months with intermittent vomiting for past 2 months. There was a positive history of addiction to alcohol, tobacco chewing, and opium.

On examination, there was a large ill-defined solitary swelling present in left side of abdomen extending approximately 6 cm above and 7 cm below the umbilicus. On head raising test swelling disappeared indicating intraperitoneal origin. USG whole abdomen revealed a large midline septated fluid collection extending from epigastrium to infra-umbilical region with heterogeneous internal echoes with few thin internal septations. CECT whole abdomen showed a large well-defined thick-walled fluid density cystic lesion in the peritoneal cavity few partial thin septations and was seen involving the omentum.

Conclusion:

Non pancreatic pseudocyst is a rare finding and one should be aware of this entity.

Keywords:

Pseudocyst, Non-pancreatic, Intra-peritoneal, Abdominal distention.

BACKGROUND

Non-pancreatic pseudocysts are lesions usually arising from mesentery or omentum and are a rare occurrence. The internal content of these cysts could be blood, pus, serous or chylous fluid. In majority of the scenarios, causation of these cysts is related to trauma, surgery or infection. In surgical scenarios, it is seen especially in cases of ventriculoperitoneal shunts, intraperitoneal dialysis catheter especially after infection, major pelvic surgery in pre-menopausal females with ovaries are demonstrated within the cysts[1], hernia surgery in which cause is due to peritoneal disruption. There can be symptoms like bowel obstruction, acute abdomen due to rupture, infection, bleeding, volvulus, or bowel ischemia.[2] The recommended treatment for non-pancreatic pseudocyst is total surgical excision. Complete excision of cyst is very crucial as there are chances of recurrence.[1]

Pseudocyst related to pancreatitis occur in 5 – 15 % of patients who have peripancreatic fluid collection after an episode of acute pancreatitis. It takes at least 4 – 8 weeks for fibrotic reaction to develop and hence for the formation of cyst capsule

which is composed of collagen and granulation tissue and is not lined by a true epithelial lining.

Up to 50% of the cases are symptomatic with common complaints of persistent pain possibly due to internal hemorrhage or infection, early satiety, nausea and weight loss due to mass effect. These are usually associated with elevated pancreatic enzymes. The diagnosis is usually made on computed tomography (CT) or magnetic resonance imaging (MRI). Observation is advised in asymptomatic cases. If symptomatic or not able to differentiate between cystic neoplasm and pseudocyst – intervention is done. [3]

CASE PRESENTATION

A 31 year old male presented in surgery OPD with chief complaints of gradually progressive abdominal distension associated with pain epigastrium for past 2 ½ months which was insidious in onset, non-progressive, intermittent, mild to moderate in intensity, non-radiating, dull aching in nature, had relieved by analgesics and with no aggravating factors. Patient also complained of associated intermittent vomiting for past 2 months which was green in color and was precipitated with intake of food. No significant history of bleeding per rectum, constipation, burning micturition, previous history of surgery, admission to hospital, trauma, contact with animals, jaundice, weight loss, loss of appetite was there. There was a positive history of addiction to alcohol, tobacco chewing, and opium.

On examination, a large solitary swelling was noted predominantly on left side of abdomen extending approximately 6 cm above and 7 cm below the umbilicus. The lateral extent was till anterior axillary line. Swelling was having ill-defined margins with soft to firm consistency. On head raising test, swelling disappeared indicating its intraperitoneal origin. On percussion, a dull note was observed.

The patient was then sent to radiology department for further evaluation. A USG whole abdomen with pelvis was requested which suggested a large midline septated fluid collection extending from epigastrium to infra-umbilical region with approximate size of 22 cm x 8.5 cm x 16 cm. There were heterogeneous internal echoes with few thin internal septations. No obvious solid component or papillary projections seen.

The further evaluation is done with CECT whole abdomen with pelvis which showed a large well-defined thick-walled fluid density cystic lesion in the peritoneal cavity measuring 16 x 8.4 x 19 cm with few partial thin septations and was seen involving the omentum. No obvious cyst wall or intracystic calcifications seen. Anteriorly, it was abutting the anterior abdominal wall and causing overlying skin bulge. Posteriorly, the lesion was closely abutting the jejunal and ileal loops and causing their luminal compression. Superiorly, it was abutting the transverse colon and splenic flexure. Inferiorly, it was abutting and displacing the ileal loops. Laterally, on left side it was abutting the descending colon. The fat planes with the above described structures were well preserved with no obvious features suggesting infiltration. Focally dilated distal ileal loops with maximum diameter measuring 3.6 cm were seen in pelvis with smooth proximal and distal tapering likely due to mass effect by the cyst. Differential diagnosis of large mesenteric cyst, peritoneal inclusion cyst and hydatid cyst were given based on imaging findings.

After all the pre - operative workup, an elective exploratory laparotomy and proceed was done under general anesthesia. On opening the abdomen, anterior wall of the cyst was adhered to anterior abdominal wall while the posterior wall was adhered to underlying bowel loops. Intra-operatively, approximately 1.0 – 1.5 Liters of hemorrhagic fluid was aspirated from the cyst and sent for cytology. Careful dissection of anterior and posterior wall of cyst was done while preventing damage to surrounding structures and was sent for histopathological examination. The histopathological examination revealed cyst wall made of fibro collagenous tissue infiltrated with mixed inflammatory cells compromising of neutrophils, lymphocytes, monocytes, occasional eosinophils and congested blood vessels. At places, cyst wall was hyalinized and showing myxoid degeneration suggestive of pseudocyst, but no definite epithelial lining was noted. The cytology revealed hemorrhage

only. Tumor marker carcinoembryonic antigen (CEA) value come out to be 1.15 ng/ml which was within normal range. (Normal range - < 5.0 ng/ml).

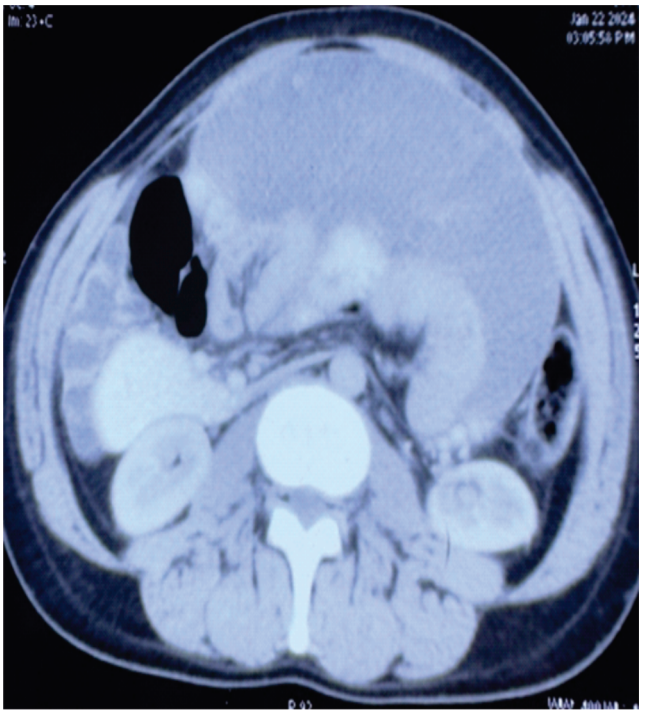

Fig 1. Axial view of CECT whole abdomen showing a large intraperitoneal thick walled hypodense cystic lesion causing focal bulge of anterior abdominal wall and compression over adjacent small bowel loops.

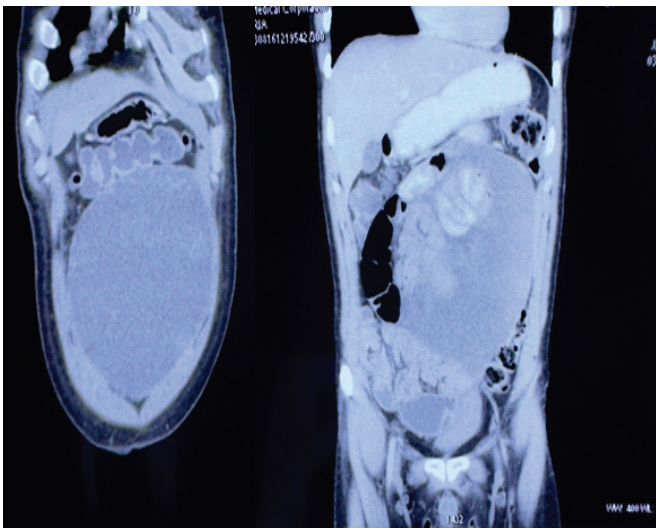

Fig 2. Coronal view of CECT whole abdomen showing relations of the cysts with transverse colon (left) and ascending & descending colon and small bowel loops. (right)

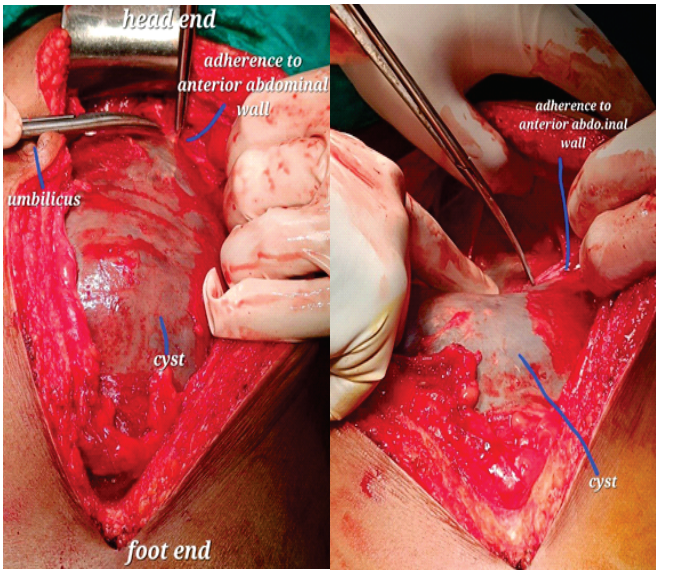

Fig 3. Intraoperative image: showing large intraperitoneal cyst adhered to anterior abdominal wall.

DISCUSSION

Non-pancreatic pseudocysts are lesions usually arising from mesentery or omentum and are a rare occurrence. The internal content of these cysts could be blood, pus, serous or chylous fluid. In majority of the scenarios, causation of these cysts is related to trauma, surgery or infection. In surgical scenarios, it is seen especially in cases of ventriculoperitoneal shunts, intraperitoneal dialysis catheter especially after infection, major pelvic surgery in pre-menopausal females with ovaries are demonstrated within the cysts[1], hernia surgery in which cause is due to peritoneal disruption. There can be symptoms like bowel obstruction, acute abdomen due to rupture, infection, bleeding, volvulus, or bowel ischemia.[2] The recommended treatment for non-pancreatic pseudocyst is total surgical excision. Complete excision of cyst is very crucial as there are chances of recurrence. [1]

Pseudocysts related to pancreatitis occur in 5 – 15 % of patients who have peripancreatic fluid collection after an episode of acute pancreatitis. It takes at least 4 – 8 weeks for fibrotic reaction to develop and hence for the formation of cyst capsule which is composed of collagen and granulation tissue and is not lined by a true epithelial lining. [3]

Mesenteric cysts can be congenital or acquired. The term "mesenteric cyst" means location of cyst rather than specific histopathological diagnosis. [1]

de Perrot and colleagues proposed a classification of mesenteric cysts based on its origin as follows: - 1) cyst of lymphatic origin; 2) cyst of mesothelial origin; 3) cyst of enteric origin; 4) cyst of urogenital origin; 5) mature cystic teratoma; 6) pseudocyst. Another way of classification as suggested by Beahrs et al. and Ros et al. as traumatic and nonpancreatic pseudocysts. The lining of mesenteric cyst is single layer of cuboidal or columnar epithelial cell which eventually can get destroyed due to pressure from the cystic fluid.[2] Therefore, the patient might be having mesenteric cyst also.

It is important to differentiate benign and malignant cystic abdominal lesions as management is dependent on the aggressive nature of the lesion.

Ours was a case of benign cyst as the cyst wall was well defined with preserved fat planes with surrounding organs and no obvious infiltration to adjacent structures seen. The tumor markers workup was normal and constitutional symptoms were absent in our patient. Other possible differential diagnosis is hydatid cyst but was ruled out due to absence of daughter cysts. Possibility of malignant cyst was ruled out as there were no supporting imaging features and histopathological examination later confirmed its benign nature.

The recommended treatment for non-pancreatic pseudocyst is total surgical excision which is achieved by enucleation, with or without segmental bowel resection, or partial cystectomy if needed as most of the instances the cyst wall is densely adhered to the adjacent organs. Procedures like marsupialization, debridement, partial excision are not commonly practiced as there is increased risk of recurrence, seeding of malignant cells or septic complications and hence considered inadequate. To minimize chances of recurrence the most important step is complete excision of the cyst wall. Another less invasive approach is laparoscopic cyst excision with advantage of early postoperative discharge, less pain, faster recovery where expertise is available. (1) Our patient underwent exploratory laparotomy and have intraoperative finding of cyst of non-pancreatic origin containing hemorrhagic fluid which come out to be pseudocyst on histopathological examination.

CONCLUSION

Alcoholic patient presented with abdominal lump which was intraperitoneal and non-pancreatic in origin. Non pancreatic pseudocysts are rare finding and one should be aware of this. This cyst can present with bowel obstruction, acute abdomen due to rupture, infection, intracystic bleeding, volvulus, or bowel ischemia.[2] The only treatment of this is total surgical excision while complete excision is crucial to minimize chances of recurrences from residual cyst. [1]

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Case Report

INTUSSUSCEPTION IN ADULTS: A RARE PRESENTATION

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Abstract

Intussusception is more commonly seen children and is a rare cause of intestinal obstruction in adult population. In adults, intussusception occur following a lead point. Here is a case report of 24 years old male presented with complaints of pain in the right iliac fossa, vomiting and obstipation. On examination irregular mass was palpated in the right lumbar region. Laboratory were within normal range and radiological investigations were done which showed ileocecal intussusception with ileocecal mesenteric lymph nodes. Colonoscopy showed large polypoid lesion involving IC junction causing ileocolic intussusception. Patient underwent Exploratory laparotomy and ileocecal resection with end to end ileo ascending colon anastomosis done. The presentation, diagnosis and treatment of intussusception varies between paediatric and adult age group.

Introduction

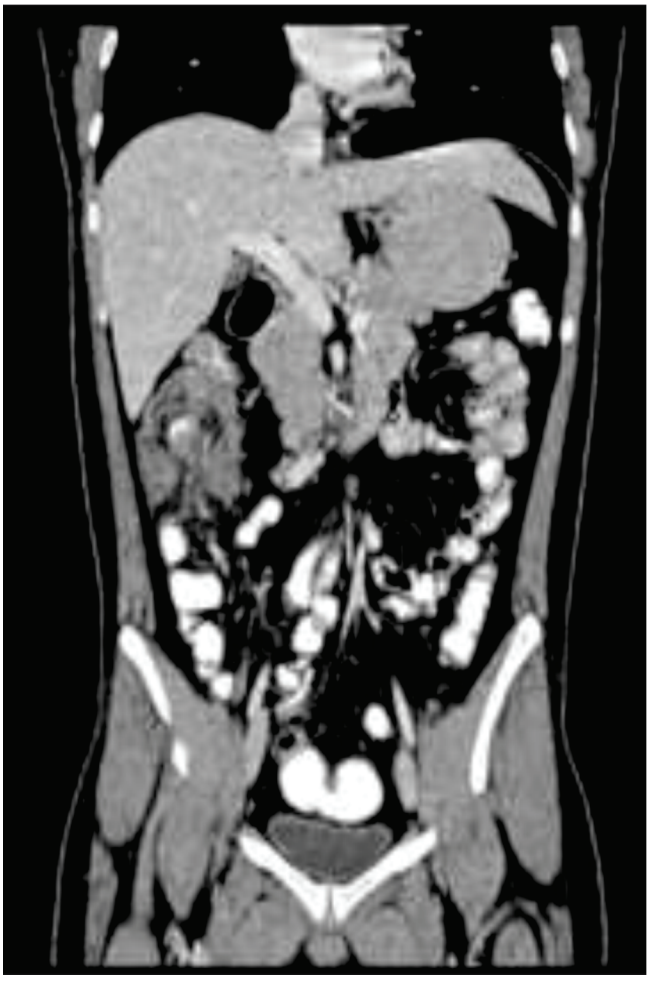
Intussusception is a potentially fatal condition that happens when a section of the intestine bends like a telescope, with one segment slipping inside another. The proximal portion that telescopes into the intestine is known as the intussceptum, and the distal portion that receives the proximal portion is known as the intussuscipiens. This process can lead to multiple complications such as bowel obstruction, bowel necrosis/gangrene leading to sepsis. The disease process is much more common in the paediatric population and uncommon in adults, but when present is likely to be due to a pathological lead point such as benign or malignant masses [1].

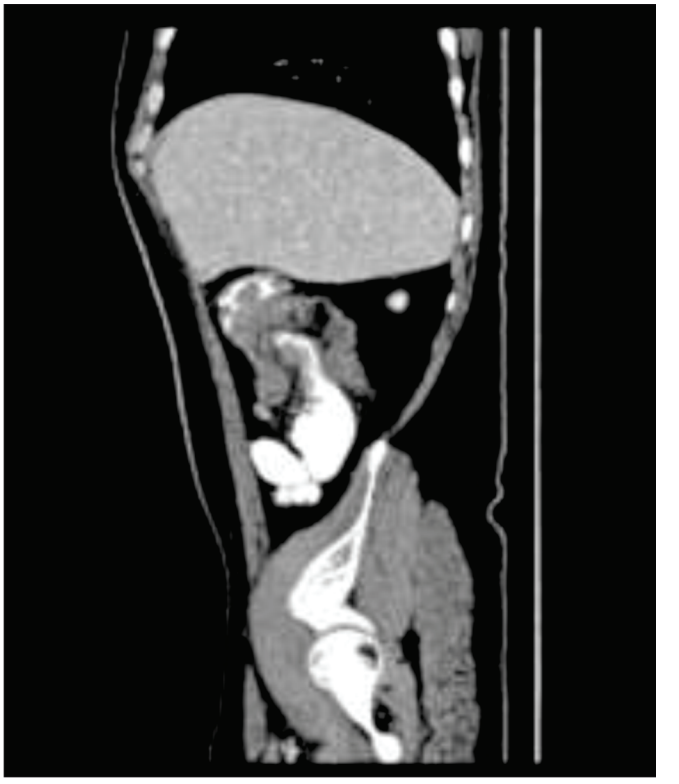
Case summary

24 years old male presented with complaints of pain in the right iliac fossa radiating to paraumbilical area for 4 months, was acute in onset and colicky in nature, on and off pain and bleeding per rectum which was dark red in colour for 4 months and 1-2 episodes of non-bilious vomiting on and off with inability to pass flatus and faeces for last 2 days. Previous history of altered bowel habits, loss of appetite and loss of weight were present. There was no history of red currant jelly stools. General physical examination of the patient was normal. Patient had average built with no pallor. On inspection, there was no visible swelling and no distention. On palpation, A palpable abdominal mass was felt in the right lumbar region extending upto the right hypochondrium and the epigastric region which was irregular in shape. Margins were not well defined with size of around 7-8 cm, Soft in consistency, there was no movement with respiration and all the quadrants were moving equally with respiration. Generalized tenderness present. Auscultation revealed increasing bowel sound. Per rectal examination indicated presence of stools without any blood staining.

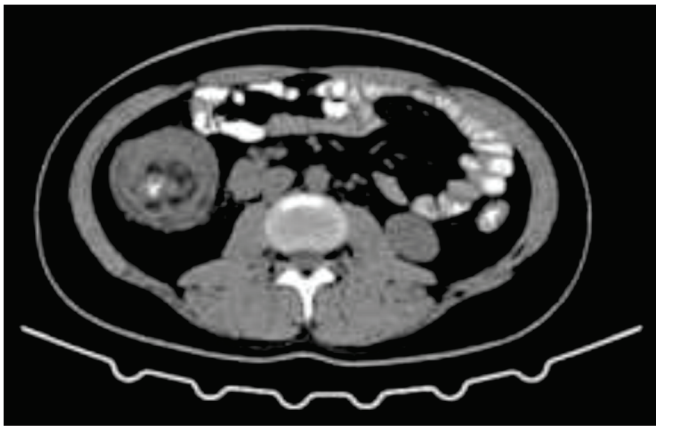
Investigations

Laboratory investigation revealed Haemoglobin to be 11 gm/dL. TLC/LFT/RFT were within normal limits. On Radiological investigation, CECT ABDOMEN showed telescoping of ileocecal junction into the caecum and proximal ascending colon with involvement of base of appendix S/O ileocecal intussusception with diffuse circumferential wall thickening about 20mm multiple enlarged homogeneously enhancing lymph nodes are noted in the right ileocecal mesentery with largest of the lymph node measures 18 mm in short axis diameter [Figure 1]. Colonoscopy showed large polypoid lesion involving IC junction causing ileocolic intussusception. Histopathology from the caecal polypoidal lesion showed ulcerated mucosa with submucosa infiltrated with marked lymphoplasmacytic infiltrate [Figure 2].





B. Sagittal Section



C. Axial Section

Fig. 1 A, B, C showing telescoping of one of the ileal segment into colonic loop

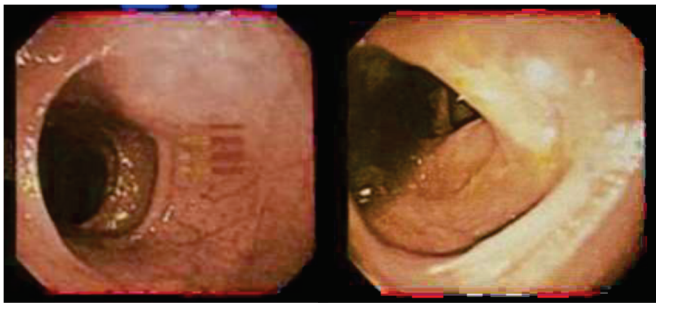


Fig. 2 Histopathology from the caecal polypoidal lesion showed ulcerated mucosa

Surgical Procedure

Exploratory laparotomy was performed, and manual reduction of the intussusception was tried but was unsuccessful and then resection of the involved bowel segment was planned, and ileocecal resection was done and end to end ileoascending colon anastomosis was done [Figure 3].

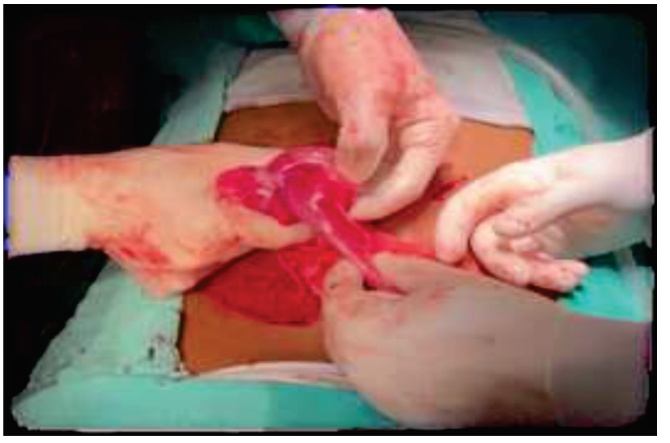


Fig. 3 Thickened, congested and inflamed terminal ileum with ileo-colonic intussusception

Discussion

Intussusception is uncommon in adults than paediatric age group. About 2-3 cases per million people are reported annually. Adults with intussusception have a different aetiology, presentation, and process of management than children. Most often, intussusception in children is idiopathic or a consequence of a viral infection. However, in over 90% of adult instances, a lead point that causes the intussusception can be identified. [2]. These lead points can be malignant neoplasms like adenocarcinoma, benign tumour adenomatous polyps, lymphoid hyperplasia, lipoma, cystic fibrosis, celiac disease, inflammatory bowel disease, appendicitis, pancreatitis, and rectal foreign bodies [3]. Adults with this condition have a relatively non-specific clinical appearance, which makes diagnosis challenging. Common symptoms include nausea, diarrhoea, bleeding per rectum, and pain in the abdomen. Rarely, acute bowel obstruction could appear. Seldom does an adult exhibit the characteristic trifecta of red currant jelly stools passing, a sausage-shaped palpable mass, and abdominal discomfort that children encounter. [2]. In contrast to the paediatric age group, the management of adult intussusception differs. Resection of the involved bowel and anastomosis remains the treatment option for adults.

Conclusion

Adult intussusception is an uncommon but challenging condition for the surgeon to manage. Due to inconsistent symptoms and a lack of the pathognomonic clinical picture associated with intussusception in children, preoperative diagnosis is frequently overlooked or delayed. In the present case, the patient's symptoms were nonspecific. When diagnosing intussusception, abdominal CT scans are thought to be the most reliable imaging technique available. Surgical intervention is required because adult intussusception is usually linked to

malignant organic lesions. Anastomosis and formal excision of the affected intestinal segment are typically required as part of the surgical procedure. When a small intestinal intussusception is viable or there is no suspicion of malignancy, manual reduction may be performed.

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Case Series

RENAL ARTERY : VARIATIONS AND IT'S CLINICAL SIGNIFICANCE

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ABSTRACT

Anatomy of renal artery and its variations is well known in literature. Anatomical variations in renal vessels have significant importance in diagnostic and therapeutic procedures. Knowledge of Accessory or aberrant renal artery is important for performing endovascular, radiological, laparoscopic procedures and surgical interventions in transplants, nephrectomies and renal vascular disorders. The present study was conducted in department of anatomy Govt. medical college Patiala, India during routine abdominal dissection for medical undergraduate students. Kidneys along with its arteries were exposed in 13 cadavers (12 males and 1 female). Variation in the form of accessory renal artery was found in two cadavers. Knowledge of variations in renal vasculature is important for clinicians uroradiological procedures and renal surgeries.

Keywords : Kidney, accessory renal artery, cadavers , variation.

INTRODUCTION

The Kidneys are vital excretory organs present behind the peritoneum over the posterior abdominal wall. They receive 20% of resting cardiac output. In 70% population, kidney is supplied by one renal artery[1]. Renal artery is lateral branch of aorta, arising at the level of second lumbar vertebra. On right side, it passes behind the inferior vena cava and thereafter, right renal vein. Whereas, on left side it usually lies behind and above the left renal vein, behind the pancreas and splenic vein. Variations in the number and arrangement of renal vessels are extremely common. Anomalous renal arteries are consistently encountered than anomalous renal veins[2]. The commonest type being the supernumerary renal artery, derived from the aorta or its abdominal or pelvic branches. Out of these arteries about half went to either pole of the kidney[3]. The accessory renal arteries supply the kidney without entering its hilum[4]. These unrecognised extra hilar, polar arteries impose surgical hazards. Also these arteries to the lower pole typically pass in front of the ureter, causing obstruction in pelviureteric region leading to hydronephrosis and other obstructive symptoms requiring surgical intervention[5]. The left sided lower pole aberrant artery has also been noted to compress the internal spermatic vein leading to left varicocele [2].

The knowledge of presence of these extra hilar accessory renal arteries guides the surgeons while dissecting the renal capsule during renal transplants or other conservative renal surgeries and therapeutic procedures. Therefore, this study imparts clinical and surgical insight to surgeons, urologists and interventional radiologists.

MATERIAL METHOD

26 kidneys of 13 cadavers comprising of 12 males and 1 female were examined after routine cadaveric dissection for the purpose of under graduate teaching in Department of Anatomy Govt. Medical College, Patiala . After removal of the other abdominal viscera, both the kidneys with their renal arteries were exposed to study any morphological variations.

RESULTS:

The study was undertaken on 13 cadavers, out of which 12 were males and 1 female. Amongst them,

two (15.38%) cadavers were found to have variations in renal arteries. In 11 (84.61%) cadavers a normal single renal artery pattern was observed. The supernumerary, accessory renal arteries were seen unilaterally, in 2 male cadavers.

The following pattern of variations were noted in these renal arteries.

1. In one cadaver unilateral accessory renal artery was seen arising from left renal artery. It followed an extra hilar course to enter into superior pole of kidney (Figure 1).

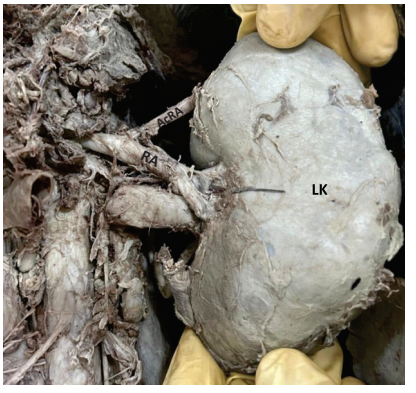

Figure 1. Accessory renal artery arising from Left Renal artery (LK; Left Kidney; AA; Abdominal Aorta; RA: Renal artery; AcRA: Accessory Renal artery)

2. In the other cadaver accessory or aberrant renal artery was seen on the right side, originating as a direct branch of abdominal aorta. It crossed the right ureter anteriorly to reach the inferior pole of kidney(figure 2).

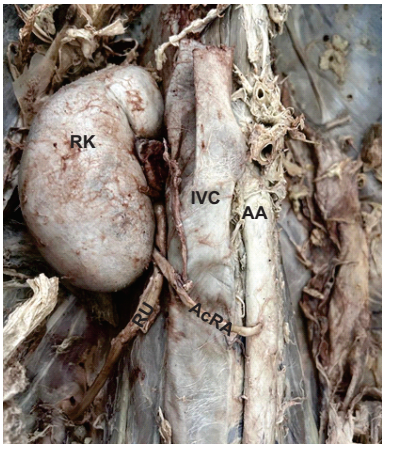

Figure 2. Accessory renal artery originating from abdominal aorta crossing right ureter (RK: Right Kidney; IVC: Inferior Vena Cava; AA; Abdominal Aorta; AcRA: Accessory renal artery)

DISCUSSION :

It is very common to find Anatomical variations in renal vasculature ,i e for about 30% [4]. These have been named as accessory or aberrant arteries. Accessory arteries originate directly from aorta either above or below the renal artery and enter the upper or lower pole of kidney [6].

The development of kidney and its vessels is complex. The prevalence of these arteries can be interpreted on embryological basis. The multiple renal arteries are vestigial remnants due to the failure of degeneration during the ascent of metanephros lying in the pelvis. In the developing fetus, the mesonephros and metanephros are supplied by nine pairs of branches of dorsal aorta namely lateral mesonephric arteries(MNA). These nine pairs are distributed into 3 groups – Cranial(first and second MNA), Middle (third to the fifth)and Caudal group (sixth to the ninth) of arteries. The renal artery develops from single pair from the middle group. The remaining arteries of the middle group have seen to result in aberrant renal arteries [7,8]. The multiple renal arteries supply a separate part of kidney and do not anastomose within kidney parenchyma. Hence, obstruction of any of these can lead to ischemic necrosis of that part [9].

In present study, accessory renal artery noted on the right side, given off directly by aorta crossed the right ureter to pierce the lower pole of right kidney. The incidence of accessory renal arteries to the inferior pole is more as compared to those passing to the superior pole. These extra renal arteries follow an anomalous course up to the lower pole, lie in such a position as to appear to obstruct the outflow of urine at pelviureteric junction leading to hydronephrosis [10].

The inferior polar arteries are seen to be more in diameter as they are derived directly from aorta. Such large calibre vessels crossing the ureter can cause compression leading to hydronephrosis 11.

Another artery originating from left renal artery was observed. It followed an extra hilar course to enter the superior pole of the kidney. This type of variant can be considered as a divisional branch from the early branching renal artery. The persons having similar early branching renal arteries are not considered suitable donors for transplants due to

smaller renal pedicle size[12].

Accessory renal arteries were noted in male cadavers in the current study. This could be attributed to smaller sample size available. However, a higher prevalence of variations is noted in males [9,13]. The awareness of increased incidence in males is worth noting clinically because , males are more affected by end stage renal failure therefore, prone to undergo renal transplants [14].

The classical bilateral renal artery remains the most common, favourable and preferred configuration for donor nephrectomy and transplant[15]. The transplantation of such kidneys is easier and has successful outcome as compared to kidneys with multiple/ supernumerary arteries. Atypical vascular pattern of renal pedicle can lead to haemorrhage and complications during anastomosis and reperfusion [11].

It is thus concluded, the knowledge and identification of variable renal vascular pattern can help transplant surgeons and interventionists to plan ahead and prevent major complications leading to improving surgical outcome.

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Case Series

SUCCESSFUL MANAGEMENT OF SEWAGE GAS POISONING

Balwinder Kaur Rekhi, Lovepreet Kaur, Diksha, Vishaldeep Singh, PC Zonunmawii, Prabhjit Singh

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ABSTRACT

Management of poisoning cases is still a big challenge to the critical care field. These poisons could be accidental, suicidal or homicidal. And in many cases antidotes are not there or they are not rapidly available. And most of the time victims are brought to critical care in mentally obtended state where the history is not even available. And one of the highly fatal type of poisoning is sewage gas poisoning. Victims scum to the toxic substance or due to secondary phenomenon of multi-organ failure.

INTRODUCTION:

Sewage gas is by byproduct of human waste. Primary components include H2S, NH3,CO2. It is not toxic at low levels. However chronic exposure or higher levels of exposure can cause symptoms of gas poisoning and can be rapidly fatal. H2S being main culprit. In high levels of exposure symptoms include: eye- throat irritation,CNS depression (>500ppm) ,seizures, cardio-respi depression, coma and even death immediately (>1000ppm).1,2 We hereby present 2 cases of successful management of sewage gas poisoning in our government setup critical care unit.

CASE REPORT:

For manual scavenging 3 sanitary care workers entered a sewer. Just on opening the lid of sewer they became unconscious and fell down. They were pulled out by their co-workers. One person died on the spot, while other 2 were taken to local hospital. Their GCS was poor < 8 were referred to our hospital. On being received in icu both were in altered mental sensorium with frothing from mouth.

CASE REPORT 1: 28 Yr /M presented in unconscious state and seizure like activity, had episode of hemoptysis in emergency. CVS: tachycardia present PR- 120/mint ,BP- 126/80 mmhg . Respiratory: RR>42/mint, spo2-92%on NRM @15L/min , on auscultation: B/L coarse crepts were present. Pupils: NSNR . GCS was E2V2M3.

Patient was immediately intubated and put on ventilator AC-VCV mode. ABG report showed acidosis PH 7.28 ,Pco2 -36.9, PO2- 147 , HCO3-17.4 , lact- 1.62 with Fio2 -100%. Chest x-ray shows B/L infiltrates. Diagnosis of acute sewage gas poisoning with chemical pneumonitis leading to ARDS was made based upon chest findings, ABG and CXR. ECG and echo was normal on the day of admission to the icu.

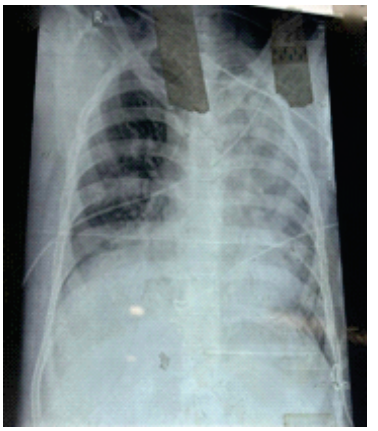
Critical illness management promptly started. Initial ventilator settings- FiO2: 100% PEEP:7 RR: 14 TV 6ml/kg. As ARDS is acute inflammatory state and early methylprednisolone is helpful, so infusion was started @ 1mg/kg/day. Dvt prophylaxis was given with LMWH.

On third day pt started desaturating ,on auscultation B/L silent chest and Bronchospasm was diagnosed. Spo2 :91%, infusion aminophy line started @0.5mg/kg/hr with ongoing methyl prednisol one infusion. Patient shifted to prone position for 18 hrs alternatively with inverse ratio ventilation and serial ABGs were done . ABG report

showed PH-7.2,PCO2-88.8,PO2-64,HCO3-40.2, lact-1.34 with FiO2-90%. Sedation started with infusion dexmedetomidine.

After 48 hrs, FiO2 decreased to 60% , repeat ABG showed improvement PH-7.56,PCO2-44.7,PO2-187,HCO3-35.4,lact-0.70. Infusions aminophyline, methylprednisolone and dexmedetomidine were reduced. On auscultation conducted sounds were present, for which chest Physiotherapy and nebulisation was done. Alongside RT feed was started.

Patient started improving clinically maintained spO2 on FiO2-40% ,PEEP requirement decreased put on SIMV-VCV mode and slowly weaned off , extubated and put on Bipap. Supportive management was ongoing- nebulisation, chest physio, spirometry, oral feed. Patient started maintaining on NRM then O2 face mask , finally brought on room air and shifted to ward in satisfactory condition after 15 days.



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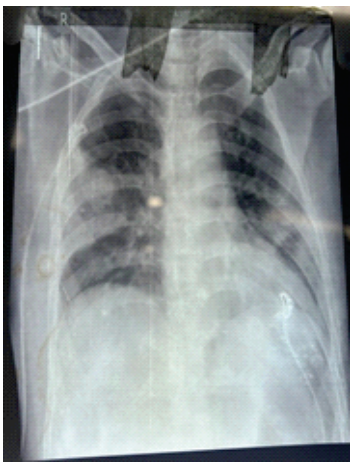

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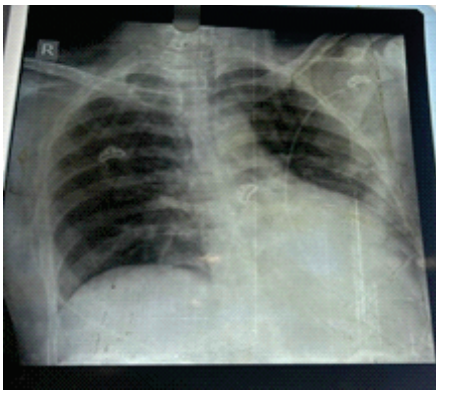

CASE REPORT 2: 24 Yr/M , presented in altered mental sensorium. On examination CVS: PR-116/min,BP -110/82mmhg ,SpO2-92% on NRM @15 L/min. Respiratory:RR-35/min, on auscultation B/L coarse crests present.Pupils: B/L NSNR , GCS:E2V2M2

Patient intubated immediately put on AC-VCV mode of ventilator. ABG :PH-7.203, PO2-75.1,PO2-90 ,HCO3-29. Infusion methylprednisolone and for sedation dexmedetomidine started. CXR-showed diffuse infiltrates. ECG and echo were normal.

On third day sedation stopped, patient put on SIMV-VCV. Patient responded to vocal commands weaned off from ventilator and extubated ,put on BiPAP. ABG improved PH:7.45, PCO2-42.3,PO2-95,HCO3-29.5, lac- 1.22. Supportive management was given : nebulisation, spirometry, adequate hydration. Patient brought on room air and shifted back to ward in satisfactory condition after 6 days.

DISCUSSION:

Sewage gas poisoning diagnosis can be made based upon history of exposure and clinical examination. In our case, 3 of the workers immediately became unconscious on entering the sewer. One out of them died on the spot. That means they were exposed to higher gas concentration levels. Exposure can lead to cardiac systolic dysfunction, chemical pneumonitis or neurotoxicity.3In our case respiratory system was involved mainly leading to ARDS and neurological symptoms. This occurs because of direct airway exposure to toxic inhalation gases leading to alveolar oedema. Patient recovered from ARDS – radiographic improvement on CXR, ABG and clinical improvement in RR and chest findings .

ARDS supportive management was done- steroid therapy, prone positioning, intravenous fluid balance, antibiotic therapy, aminophyline infusion for reactive airway. Chest Physiotherapy, postural drainage was done. Nutrition maintained through RT feed. Nitrite was procured very late so was not used.3,4,5

CONCLUSION:

Early definitive diagnosis and icu shifting with appropriate pharmacological treatment along with different modes of mechanical ventilation led to the successful management of sewage gas poisoning.

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33.	LM/G-6/2021	Dr. Gurlivleen Kaur - Anesthesia
34.	LM/H-I /2016	Dr. H S Rekhi - Surgery
35.	LM/H-2/2016	Dr. Hari Om Aggarwal - Orthopedics
36.	LM/H-3/2017	Dr. Harsimarjit Kaur - Anatomy
37.	LM/H-4/2019	Dr. H K S Chawla - Orthopedics
38.	LM/H-5/2021	Dr. Harjinder Singh - Urology
39.	LM/H-6/2021	Dr. Harbhupinder Singh - Urology (LM/G-6/2021)
40.	LM/J-1/2021	Dr. Jaswinder Singh - Surgery
41.	LM/K-1/2016	Dr. Kanchan Bhardwaj - Transfusion Medicine
42.	LM/K-2/2016	Dr. K K Aggarwal - Forensic Medicine
43.	LM/K-3/2017	Dr. Kuldeep Garg - Plastic Surgery (Couple P-3)
44.	LM/K-4/2017	Dr. Kuldeep Singh Bhatia - Surgery
45.	LM/K-5/2021	Dr. Kuldeep Singh Sandhu - Ortho
46.	LM/L-1/2021	Dr. Lalit Kumar - Anesthesia (Couple- A-8)
47.	LM/M-1/2016	Dr. Maninder Kaur - Biochemistry

48.	LM/M-2/2016	Dr. Mohanvir Kaur - Hematology
49.	LM/M-3/2017	Dr. Manoj Mathur - Radiology
50.	LM/M-4/2017	Dr. Manjit Kaur Mohi - Gynae
51.	LM/M-5/2017	Dr. Manpreet Kaur - Gynae
52.	LM/M-6/2017	Dr. Manjit Singh - ENT
53.	LM/M-7/2020	Dr. Manpreet Kaur Walia - Eye
54.	LM/M-8/2021	Dr. Mandeep Kaur - Anaesthesia
55.	LM/M-9/2021	Dr. Manju Bala - Anatomy
56.	LM/N-1/2017	Dr. Navneet Kaur - Pathology
57.	LM/N-2/2020	Dr. Neeraj Mittal - Psychiatry
58.	LM/N-3/2021	Dr. Neeru Bedi - Radiation Oncology (Couple - LM/P-9/2021)
59.	LM/N-4/2021	Dr. Neetu Sharma - Pharmacology
60.	LM/N-5/2021	Dr. Navneet Kaur - Gynae & Obs.
61.	LM/P-1/2016	Dr. Preet Kanwal Sibia - Gynae. & Obs. (Couple R-3)
62.	LM/P-2/2016	Dr. Puneet Gambhir - Community Medicine (Couple S-1)
63.	LM/P-3/2017	Dr. Parveen Mittal - Pediatrics
64.	LM/P-4/2017	Dr. Paras Pandove - Surgery
65.	LM/P-5/2017	Dr. Prem Chand Singla - Surgery
66.	LM/P-6/2020	Dr. Parneet Kaur - Gynecology
67.	LM/P-7/2020	Dr. Preetinder Singh Chahal - Forensic Medicine
68.	LM/P-8/2021	Dr. Parmod Kumar - Anesthesia
69.	LM/P-9/2021	Dr. Parvinder Singh - ENT
70.	LM/R-1/2016	Dr. Rajni Bassi - Transfusion Medicine
71.	LM/R-2 /2016	Dr. Rupinder Kaur Bakshi - Microbiology
72.	LM/R-3/2016	Dr. R P S Sibia - Medicine
73.	LM/R-4/2016	Dr. Rajan Singla - Anatomy
74.	LM/R-5/2020	Dr. Rajesh Kumar Badhan - Radiology (Couple S-9)
75.	LM/R-6/2021	Dr. Ranjana - Pharmacology
76.	LM/R-7/2021	Dr. Raja Paramjeet Singh Benipal - Radiation Oncology
77.	LM/R-8/2022	Dr. Ravisha Bhardwaj - Orthopedics
78.	LM/S-1/ 2016	Dr. Saryu Gupta - Radio diagnosis
79.	LM/S-2/2016	Dr. Sarabjit Kaur - Gynecology
80.	LM /S-3/2017	Dr. Seema Goyal - Skin
81.	LM /S-4/2017	Dr. Sanjay Goyal - Medicine
82.	LM/S-5/2017	Dr. Sanjeev Bhagat - ENT
83.	LM/S-6/2017	Dr. Sangeeta Aggarwal - Gynae (Couple-H2)
84.	LM/S-7/2017	Dr. Shelly Jetly - Transfusion Medicine
85.	LM/S-8/2020	Dr. Satinder Pal Singh - Forensic Medicine
86.	LM/S-9/2020	Dr. Sudesh Kumari - Chest & TB
87.	LM/S-10/2021	Dr. Satinder Pal Kaur - Obs. & Gynae.
88.	LM/S-11/2021	Dr. Sanjeev Gupta - Surgery
89.	LM/T-01/2021	Dr. Tripat Kaur - Anesthesia
90.	LM/T-02/2022	Dr. Tanveer Singh Kundra - Anesthesia
91.	LM/ V-1/2016	Dr. Vishal Chopra - Chest & TB
92.	LM/V-2/2016	Dr. Vinod Dangwal - Radiotherapy
93.	LM/V-3/2016	Dr. Vijay Bodal - Pathology (Couple S-2)
94.	LM/V-4/2016	Dr. Vijay Sehgal - Pharmacology
95.	LM/V-5/2017	Dr. Vandna Singla - Clinical Pathology

Format of Application for Membership

To
The Editor
Journal Club Government Medical College Patiala Punjab India

Dear Sir/Madam

I wish to become a Life Member/Annual Member of the Journal Club GMC Patiala. I am furnishing the required particulars below with a request to enroll me in the Journal Club.

The fee of Rs. 5000/ Rs. 8000/- Rs 1000/- for Life Membership (Single/Couple)/ Annual Membership is enclosed as a Demand Draft/ Cheque with No._____of _____Bank, in the name of Journal Club Government Medical College Patiala along with my two passport size photographs.

I have gone/will go through the rules and regulations of the Journal Club and I agree to abide by the same.

PARTICULARS

1. Full name (in block letters)
2. Father's/Husbands' name
3. Qualification
4. Official Designation & Place of Posting
5. Permanent Address
6. Phone No. & Email

Place Yours Sincerely

Date (Signature)

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GMC Patiala Journal of Research and Medical Education

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N,B. This is the permanent page for the Founder Team (Editorial Board)