Section Radio-Diagnosis

Original Research Article

ROLE OF RADIOLOGIST AND RADIOLOGICAL TECHNIQUES IN EVALUATION OF DIFFERENT TYPES OF FISTULAS IN BODY

N. Harish[1], Mahaboob Khan[2], Nancy Dora[3], Fouzal Hithaya[4]

[1]Junior Resident, Department of Radiodiagnosis, Tirunelveli Medical College, India.
[2]Associate Professor, Department of Radiodiagnosis, Tirunelveli Medical College, India.
[3]Professor & Hod, Department of Radiodiagnosis, Tirunelveli Medical College, India.
[4]Assistant Professor, Department of Radiodiagnosis, Tirunelveli Medical College, India.

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Corresponding Author:
Dr. Harish N
Email: harishntinku2710@gmail.com

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Abstract

Background: A fistula is an abnormal communication between two hollow spaces which is lined epithelium. There are various types of Fistulas with different etiologies. Imaging of these fistula provides necessary information for internventionist to plan their approach and management. As radiologist, by using different types of radiological techniques and demonstrating these fistula plays major role in management of patients.These fistula can be demonstrated by different radiological technique such as X ray fistulogram , CT-fistulogram, ultrasonography , Doppler , CT- cystogram and MRI. Each of these techniques have their unique role in evaluating fistula. Depending upon the pathology and involved site radiological technique is and used for evaluation of fistulas. Aim of The Study: "Role of Radiologist and Radiological Techniques in evaluation of different types of fistulas in body" Objectives: Demonstrating different types of fistulas using different radiological techniques. Prevalence of different types of fistula in tertiary care hospital **Materials and Methods:** Study area, Study was conducted in Department of radiodiagnosis, government Tirunelveli medical College, a tertiary care hospital. Study design, Case study, Study Duration 1 year (January 2022 - January 2023), Study population Patient's selected based on the inclusion and exclusion criteria. Sample size, suspected fistula Cases referred to department of radiodiagnosis in Tirunelveli medical college and hospital. Total cases 57. Inclusion criteria, Fistula cases which were referred to Department of radiodiagnosis for imaging. Exclusion criteria: Patients who were allergic to contrast - in case of contrast needed for evaluation of the fistula. Anterograde urethrogram, after placing the patient in supine position foreskin of the penis is retracted and antiseptic solution (Povidone Iodine) is applied. Topical local anesthesia (Lidocaine) was injected into urethra. Before imaging patient was positioned in oblique to visualize the full length of the urethra. Contrast was injected into urethra through syringe. Entire length of the urethra with (bladder should be visualized cm for ideal images. Doppler and ultrasound. Using LOGIQ P9 and MINDRAY examination was done. CT chest. Slice thickness - 5 mm with reconstructed 2 mm images was obtained. Scan extent - from lung apices to liver. CT Abdomen. Size thickness - 5 mm with reconstructed 2 mm images were obtained. Scan extent - lung bases to upper thigh. In necessary areas of contrast (Iohexol) was used including oral, intravenous and rectal. CT cystogram. Urinary bladder was empty with foley's catheter under approximately 300 mL of contrast was injected into the bladder for visualization of pathology. Magnetic resonance imaging. T1, T2, diffusion weighted, ADC and STIR sequences were used. Heavily T2Wt images were used (HASTE Sequence) in MRCP. Other imaging technique includes injection of contrast through external opening of fistula and imaging was done. For demonstration of fistula negative window, maximum intensity projection and minimum intensity projection images were used. **Results:** In this study, 57 cases of fistulas were studied in which Most Common Age Group 35-45 was having slight male predominance. Most common fistula in the study was fistula in ano and most commonly used to modality was MRI. In fistula in ano intersphincteric type was the most common one. Most common pancreatic

fistula was pancreaticopleural fistula. Both brachiocephalic fistula and radiocephalic fistula were equally done in CKD patients for hemodialysis. Other rare cases such as parotid fistula, bowel related fistulas, bronchopleural cutaneous fistula and perianal urethrocutaneous fistula were demonstrated in this study. **Conclusion:** As Radiologist it is important to get experienced with different types of fistula and their imaging in different modalities from conventional to magnetic resonance imaging. This will pave a way for interventionist to plan their approach and management of fistulas.

INTRODUCTION

Review of Literature

An abnormal communication between external cutaneous opening in the perianal region to the internal opening most often in the anal canal. Most common cause was cryptoglandular origin resulting from the infection of anal glands. Other causes including tuberculosis, Crohn's disease, ulcerative colitis, pelvic infections and also trauma.

For successful management complete anatomy a fistula must be done. Radiological imaging helpful and identification of internal opening and external opening. And also if there is any secondary tract or abscess canal can also be identified. number of radiological modalities can be used for evaluation of fistula in ano starting from conventional fistulography to MRI Best Modality for demonstration of fistula in ano as magnetic resonance imaging.

A standard imaging approach includes utilization of T2Wt sequence in conjunction with T1Wt images. GRE and STIR sequences plays major role in diagnosis. Contrast T1Wt images can help following reduction of inflammation under differentiation of scarring and granulation tissue.

Anatomy of anal canal

Extension of anal canal is from perianal skin to anorectal ring. Surgical anal canal measures approximately 4-5 cm in total length with anorectal ring lying approximately 1-1.[5] cm from linear dentata.

There are 3 layer compressing anal sphincter

- Internal sphincter - circular smooth muscle of the rectum which is involuntary and contracted during rest and a relaxs at defecation.
- Intersphincteric space
- External sphincter - it is a voluntary striated muscle divided x 3 layers which after 1 functional unit and continuous cranially with the puborectalis muscle and levator ani muscle.

MATERIALS AND METHODS

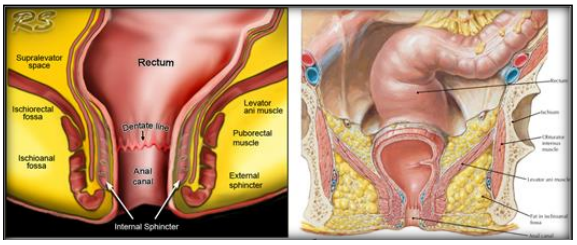

Figure 1 & 2: Coronal view of the lower sigmoid colon, rectum, anal canal, and ischioanal fossa

Goodall Rule

States that the internal opening at the fistula mainly depend upon where the fistula located relatively to the anal clock and Anal transverse line. If the internal openings anterior to the anal transverse line which is usually a radial fistulous track and if it is posterior it will be Tortuous and enter posteriorly in the midline.

Table 1: Fistula classifications

Parks	St. James hospital
Intersphincteric (~70%): fistula crosses the intersphincteric space and does not cross the external sphincter	Grade 1: Simple linear intersphincteric fistula
Transsphincteric (25%): fistula crosses from the intersphincteric space, through the external sphincter, and into the ischiorectal fossa	Grade 2: Intersphincteric fistula with an abscess or secondary tract
Suprasphincteric (5%): fistula passes superiorly into the intersphincteric space, and over the top of the puborectalis muscle then descending through the iliococcygeus muscle into the ischiorectal fossa and then skin	Grade 3: Simple linear transsphincteric fistula Grade 4: Transphincteric fistula with an abscess or secondary tract in the ischiorectal or ischioanal fossa
Extrasphincteric (1%): fistula crosses from the perineal skin through the ischiorectal fossa and levator ani muscle complex into the rectum (i.e. it is outside the external anal sphincter)	Grade 5: Supralevator or translevator disease

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Figure 3: Coronal T1 MR image of the pelvis

- The fat within the ischioanal fossa allows for the distention of the anal canal as feces are expelled
- The levator ani muscle comprises most of the pelvic diaphragm and is the muscle that is contracted during Kegel exercises, which may be done in women to reduce urinary incontinence

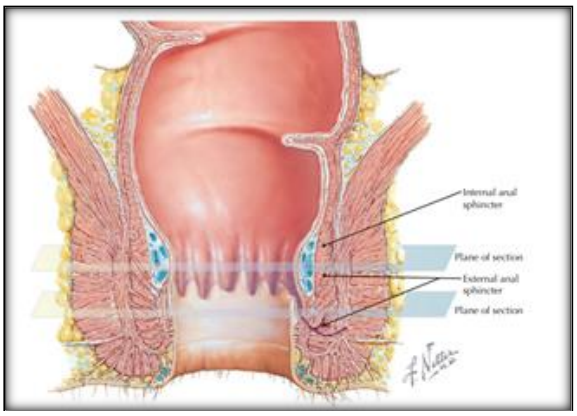

Figure 4: Anal sphincters

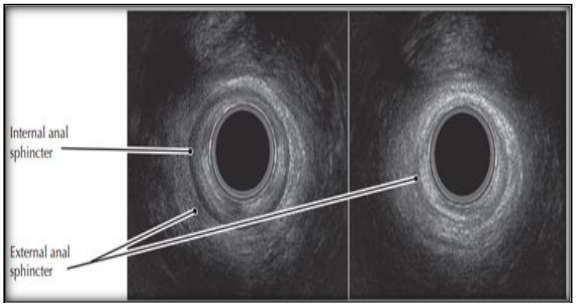

Figure 5: Middle and distal TRUS

- The internal anal sphincter is under autonomic (parasympathetic) control, whereas the external anal sphincter is under somatic control.
- The puborectalis muscle, which is part of the levator ani muscle, is instrumental in maintaining continence and is seen in more proximal, endoanal US images than shown here.
- The internal anal sphincter is hypoechoic and does not extend to the distal anal canal, while the external anal sphincter is hyperechoic and does extend distally. This difference in echogenicity correlates with the histologic differences in these muscles (smooth and striated).

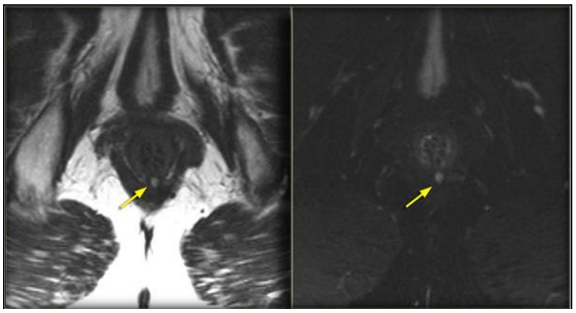

Figure 6: T2W images with and without fat saturation. An intersphincteric fistula is located at 6 o'clock.

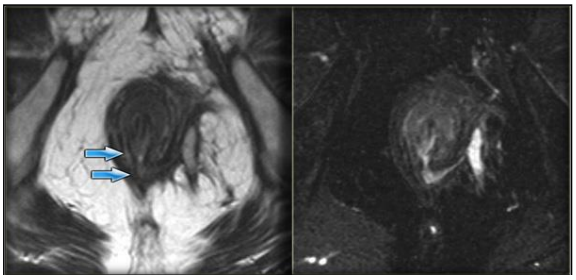

Figure 7: T2WI and T2WI + fatsat of a transsphincteric fistula. The defect through the internal and external sphincter at 6 o'clock

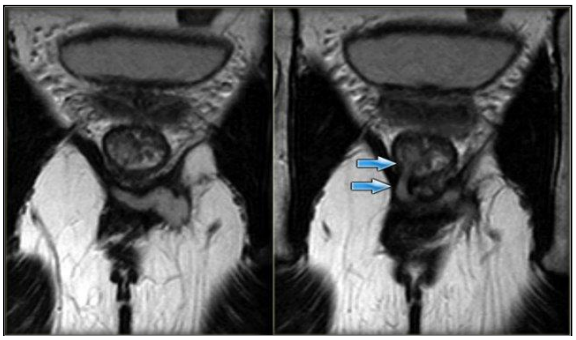

Figure 8: coronal T2W-images of a small abscess in the left ischioanal fossa, the fistula runs through the levator ani. It is therefore above the sphincter complex and extrasphincteric

Pancreaticopleural fistula

Since late 1960s itself literature has shown cases of pancreatic pleural fistula. It is mainly is seen in patients with acute and chronic pancreatitis or it may follow traumatic and surgical disruption of pancreatic duct. It is mainly characterized by massive pleural effusion which frequently reoccur even after thoracocentesis.

Prevalence is approximately 3 to 7 % with pancreatitis. Left sided pleural effusion is most common and reported in 76% of cases. It is a consequence of leak from an incompletely formed

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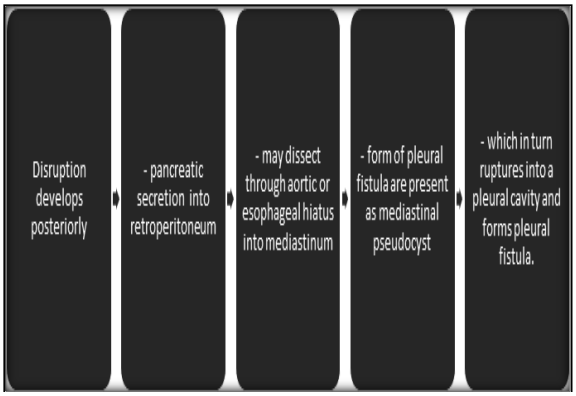
or ruptured pseudocyst. And also seen in minor ET of cases due to direct pancreatic duct leak.
Fistulous track either passes through aortic hiatus or through esophageal diaphragmatic orifice. Sometimes, directly trans diaphragmatically. If the disruption of pancreatic duct anteriorly and it is not walled off results in pancreatic peritoneal fistula which in turn develops refractory ascites.
In case of pancreatic pleural fistula.



- Often diagnosis of pancreatic process twice delayed in literature it is reported full range from 12-49 days.
- Pleural fluid Amylase level over 50000 units per L is characteristics of pancreatic pleural fistula.
- Treatment includes medical management: Thoracocentesis and Somatostatin analogs supplements (acute).
- ERCP guided pancreatic duct stent placement

Figure 9:

The red arrow shows a possible fistulous connection between a peripancreatic fluid collection and the left pleural space.
Brachialcleft fistula:

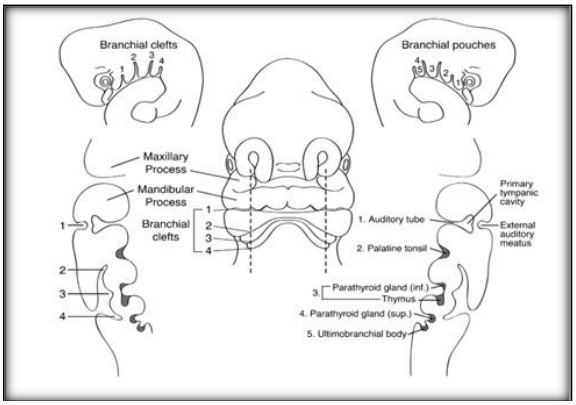


Figure 10: Frontal schematic representation of a 5-mm human embryo at the fifth week of gestation. Sagittal sections taken through the branchial apparatus demonstrate the anatomic relationship of external clefts and internal pouches as well as the derivation of important head and neck structures. The sixth arch is very small and not visualised as a separate,discrete structure from pouch

Derivatives of branchial cleft and pouches

Table 2:

	Pharyngeal arch	Aortic arch artery	Cranial nerve	Muscular structures	Skeletal structures	Adult structures
External auditory meatus	I (Mandibular arch)	Maxillary artery	Trigeminal (V)	Mandibular prominence: muscles of mastication, anterior belly of digastric, tensor tympani, tensor veli palatini, mylohyoid. Maxillary prominence: none.	Mandibular prominence: mandible, incus, malleus, Meckel's cartilages. Maxillary prominence: maxilla, zygomatic bone, squamous temporal bone, palatine bone, vomer.	Middle ear auditory tube, tympanic activity
	II (Hyoid arch)	Stapedial artery, hyoid artery	Facial nerve (VII)	Muscles of facial expression, (buccinator, platysma, auricularis, frontalis, orbicularis oris, orbicularis oculi) stylohyoid, posterior belly of digastric, stapedius.	Lesser horn of the hyoid bone, superior half of hyoid body, stapes, styloid process.	Supratonsillar fossa, crypts of palatine tonsils
Cervical sinus of His	III	Common carotid, internal carotid artery	Glossopharyngeal (IX)	Stylopharyngeus	Greater horn of hyoid bone, inferior half of hyoid body.	Thymus, inferior parathyroid glands
	IV	Right-Proximal subclavian artery Left-Aortic arch	Vagus nerve (X), superior laryngeal nerve	Intrinsic muscles of soft palate, levator veli palatini, cricothyroid	Laryngeal cartilages: thyroid cartilage, cricoid cartilage, arytenoid cartilage, corniculate cartilage, cuneiform cartilage, epiglottic cartilage	Superior parathyroid glands, C-cells of thyroid
	VI	Right – proximal pulmonary artery Left – proximal pulmonary artery and ductus arteriosus	Vagus nerve, recurrent laryngeal nerve	Intrinsic muscles of the larynx, (not cricothyroid)	Laryngeal cartilages: thyroid cartilage, cricoid cartilage, arytenoid cartilage, corniculate cartilage, cuneiform cartilage.	

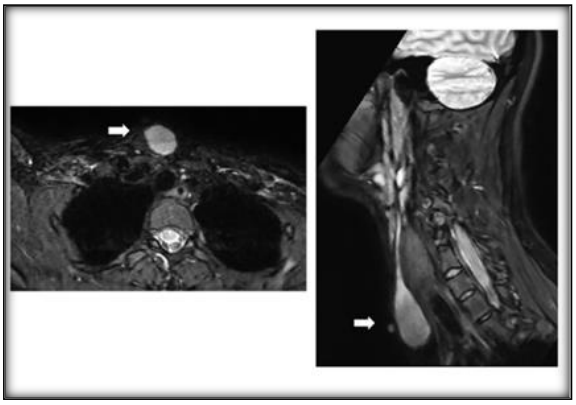


Figure 11: Axial turbo spin-echo T2-weighted Dixon MRI scan shows the external opening at the lower cervical region (arrow). Sagittal turbo spin-echo T2-weighted Dixon MRI scan shows the exit location of the fistula in the neck (arrow)

Arteriovenous fistula

Hemodialysis has important role in long-term survival of patients with end-stage-renal disease (ESRD). To maintain on long-term dialysis, vascular access procedure are required. The arteriovenous fistula (AVF) provides the best access for longevity and lowest morbidity and mortality. After surgical creation, the vein will be distended to

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become a successful arterio venous fistula (AV). Fistula then undergoes a remodeling process that is referred to maturation., these changes occur relatively rapidly, resulting in a fistula that can be repetitively used and which can provide adequate dialysis treatments

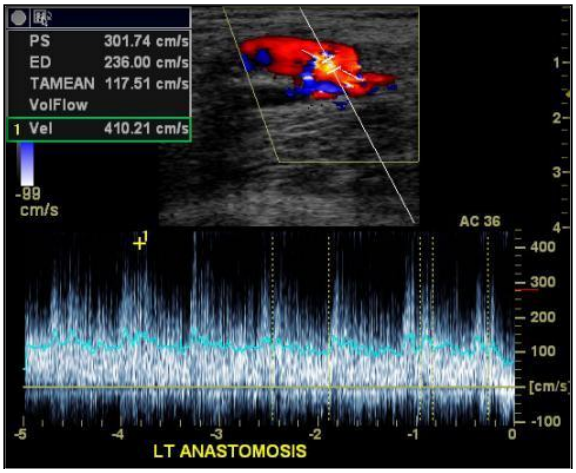

Figure 12: Spectral Doppler analysis of an AV fistula at the anastomosis. Normal flow at an AV fistula anastomosis is usually turbulent and high velocity

Parotid fistula

Fistulas of the parotid gland are uncommon and result from either ductal or parenchymal injury. External opening may be seen most commonly in cheek or post auricular region. Internal Opening may be communicating with either intra-parotid ducts or stensons duct.

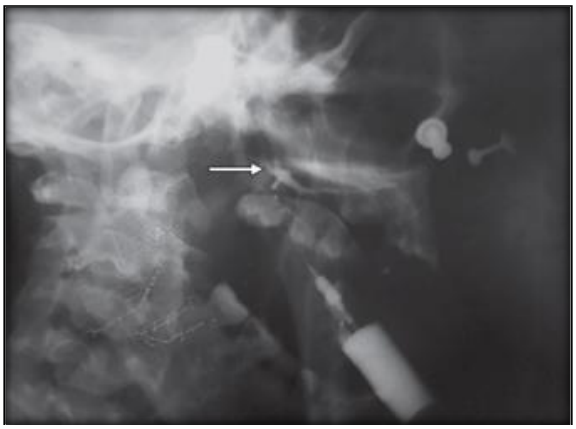

Figure 13: Sinogram showing tract

Enteric fistula

- Gastrointestinal fistulation noted between colon and the small bowel. Number of causes were included in colo enteric fistula such as Crohn's disease, colorectal carcinoma, surgery, diverticulitis.
- Abnormal communication between rectum and urinary bladder is rectovesical fistula and Communication Between colon and bladder is Colovesical fistula. Etiology were same as mentioned in enteric fistula.

Figure 14: Fistulous tract from the posterior wall of bladder to the upper rectum

Broncho Pleuro- cutaneous fistula

- It is communication between the bronchial tree and the pleural space with extension to cutaneous plane.
- Causes includes traumatic, postinfectious (tuberculosis)

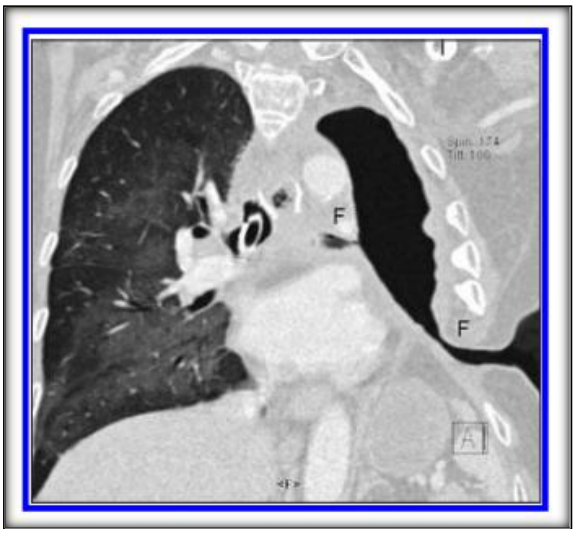

Figure 15: Coronal reconstruction CT image of thorax shows bronchopleural cutaneous fistulas (F)

RESULTS

Table 3: Age Distribution

Age Group	No of cases (N)	Percentage (%)

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<15	1	1.75%
15-24	2	3.51%
25-34	10	17.54%
35-44	25	43.86%
45-54	15	26.32%
>55	4	7.02%
Grand Total	57	100.00%
Mean	40.23	
SD	9.258	

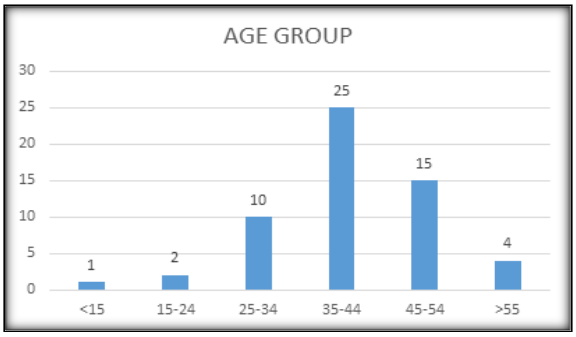

Figure 1: Age Distribution

In total of 57 cases of fistula, most Common Age Group having large number of fistula cases were 35-45yrs which accounts for approximately 43.86%. Second most Common Age Group was 45-54yrs which accounts for approximately 26.32%.

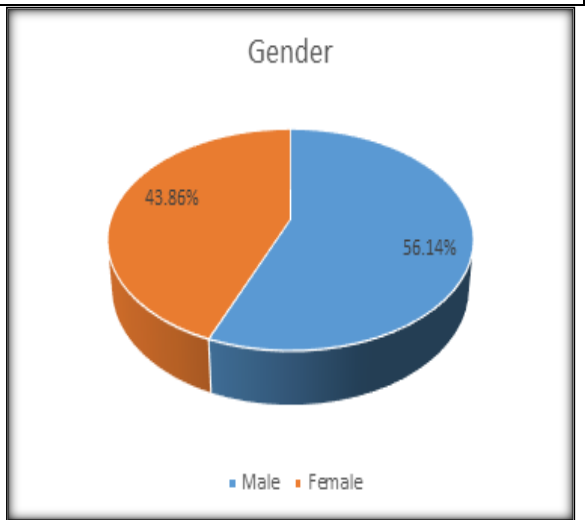

Figure 2: Gender Distribution

Slight male predominance seen in this study with total of 32 male cases accounting for 56.14% and female cases total of 25 accounting for 43.86%.

Table 4: Gender Distribution

Gender	No of cases (N)	Percentage (%)
Male	32	56.14%
Female	25	43.86%
Grand Total	**57**	**100.00%**

Table 5: Types of Fistulas

Type of fistula	No of cases (N)	Percentage (%)
Arterio - Venous Fistula	10	17.54%
Branchial cleft fistula	4	7.02%
Broncho - Pleuro - cutaneous - fistula	2	3.51%
Colonic - Vesical Fistula	2	3.51%
Enteric Fistula	2	3.51%
Fistula in ano	30	52.63%
pancreatico - Peritoneal fistula	1	1.75%
pancreatico - Pleural fistula	2	3.51%
Parotid Fistula	2	3.51%
Peri - anal - Urethral Cutaneous Fistula	2	3.51%
Grand Total	57	100.00%

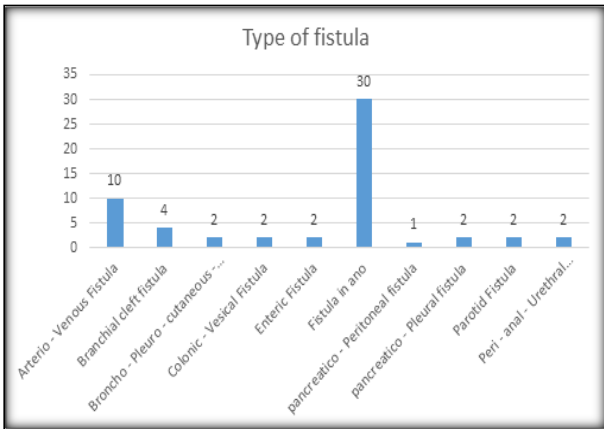

Figure 3: Types of Fistulas

Of different types of fistula in this study, fistula in ano holds for maximum number of cases accounting for 52.63% and the second most common fistula was arteriovenous fistula created for hemodialysis in chronic kidney disease patients.

Table 6: Modalities Used

Modality	No of cases (N)	Percentage (%)
CECT	4	7.02%
DOPPLER	10	17.54%
MRI	32	56.14%
MRI, CT	11	19.30%
Grand Total	57	100.00%

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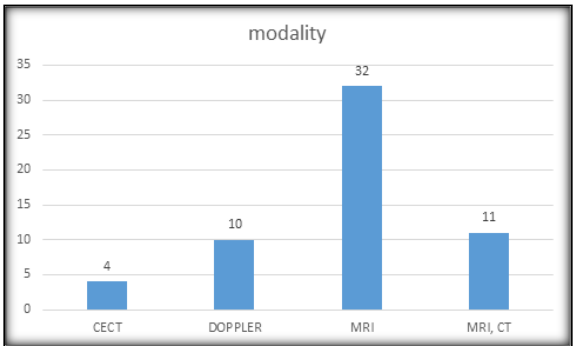

Figure 4: Modalities Used

Different types of modalities were used in this study, in which MRI was the most commonly used modality accounting for 56.14% cases. Second most commonly used method was using both CT and MRI as correlation for demonstrating the fistula.

Table 7: Fistula in ANO and Its Types

Fistula in ano	No of cases (N)	Percentage (%)
intersphinteric	20	35.09%
transsphinteric	7	12.28%
suprasphinteric	2	3.51%
extrasphinteric	1	1.75%

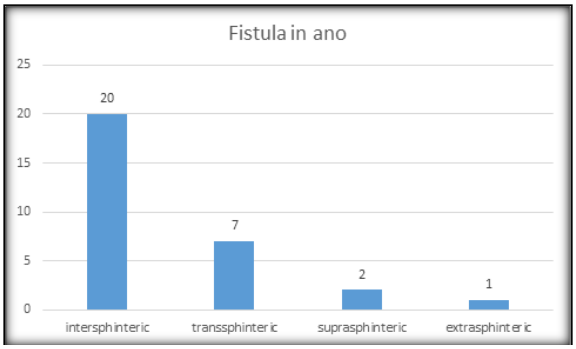

Figure 5: Fistula in ANO and Its Types

Out of 30 fistulas in ano cases most common was intersphincteric type which accounting for 35.9% days followed by a transphincteric type.

Table 8: Pancreatic Fistula

Pancreatico - fistula	No of cases (N)	Percentage (%)
pancreatico - Pleural fistula	2	3.51%
pancreatico - Peritoneal fistula	1	1.75%

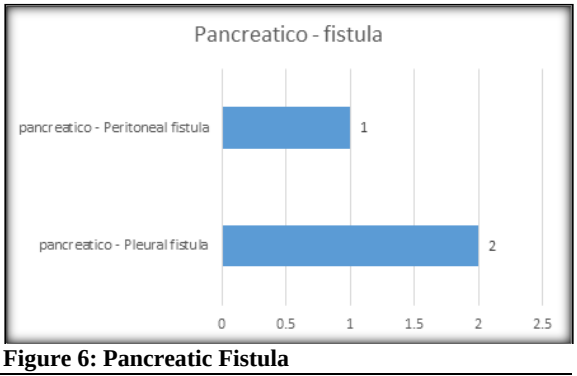

Figure 6: Pancreatic Fistula

Pancreatic fistula cases were 3 of which pancreatic pleural fistula was the most common one accounting for 3.51%.

Table 9: Branchial Cleft Fistula

Branchial cleft fistula	No of cases (N)	Percentage (%)
2nd Branchial cleft fistula	2	3.51%
Others	2	3.51%

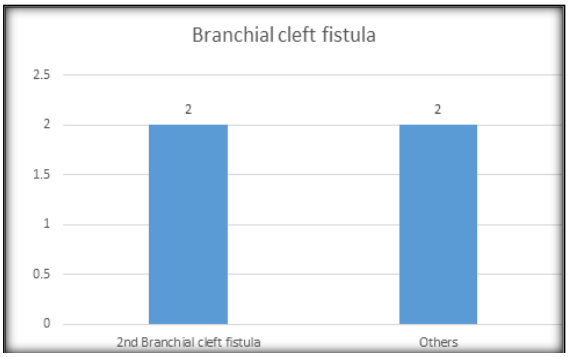

Figure 7: Branchial Cleft Fistula

Total number of branchial cleft fistulas were 4 of which second branchial cleft fistula was most common one accounting for 3.51% of total four cases.

Table 10: Arteriovenous Fistula

Arterio - Venous Fistula	No of cases (N)	Percentage (%)
Brachio cephalic fistula	5	8.77%
Radio - Cephalic Fistula	5	8.77%
Matured	6	10.53%
Failed with complications	4	7.02%

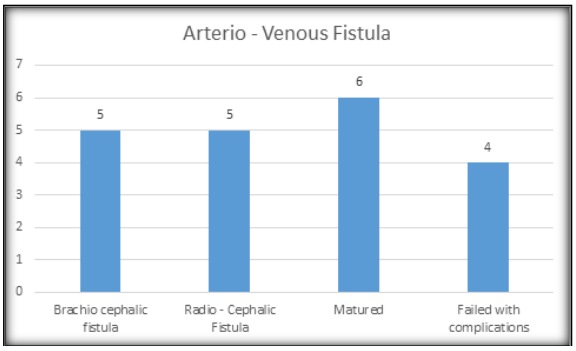

Figure 8: Arteriovenous Fistula

Arteriovenous fistula in CKD patients for hemodialysis accounts for total of 10 cases of which brachiocephalic fistula was done in 5 patients and a radiocephalic fistula was done in 5 patients each accounting for 8.77%.

Of total of 10 cases of AVF ,4 cases where failed with complication and 6 were matured.

Complications in AVF were

1. Thrombosed vein adjacent to AVF site.
2. Stenosis of anastomotic site of aVF.
3. Pseudoaneurysm of aVF.
4. Lymphocele of AVF

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Table 11: Parotid Fistula

Parotid Fistula	No of cases (N)	Percentage (%)
Parotid - Ducto - Cutaneous Fistula	1	1.75%
Stenson - Ducto - Cutaneous - Fistula	1	1.75%

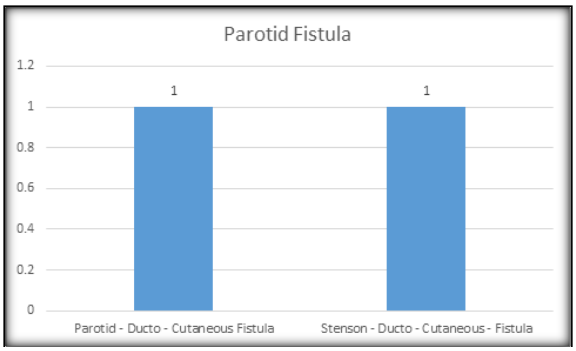


Figure 9: Parotid Fistula

Out of 57 cases, parotid fistulas were 2 cases, which includes parotid ductocutaneous fistula and stenson duct-cutaneous fistula and each accounting for 1.75%.

Table 12: Bowel Related Fistulas

Bowel Related Fistula	No of cases (N)	Percentage (%)
Enteric Fistula	2	3.51%
Colonic - Vesical Fistula	2	3.51%

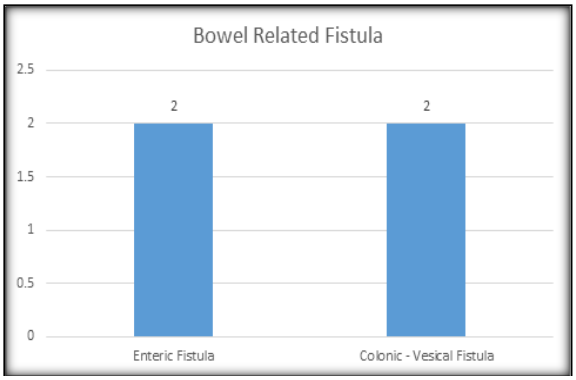


Figure 10: Bowel Related Fistulas

Bowel related fistulas were 4 cases of which Enteric Fistula were 2 and colonic vesical fistula were 2 each accounting for 3.51 %.

Table 13: Broncho-Pleuro-Cutaneous-Fistula

Broncho - Pleuro - cutaneous - fistula	No of cases (N)	Percentage (%)
Trauma	1	1.75%
Empyema	1	1.75%

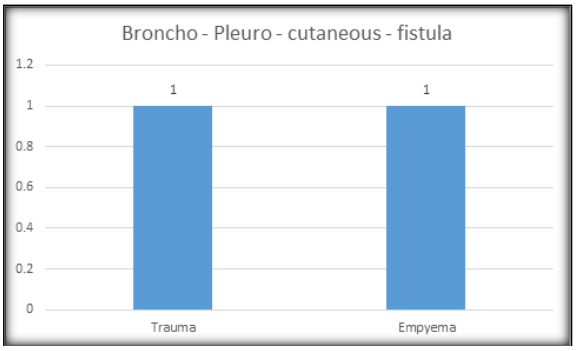


Figure 11: Broncho-Pleuro-Cutaneous-Fistula

Bronchopleural cutaneous fistulas were 2 cases out of total 57 cases each accounting for 1.75%.

Table 14: Peri - anal – Urethro-Cutaneous Fistula

Peri - anal – Urethro-Cutaneous Fistula	No of cases (N)	Percentage (%)
Yes	2	3.51%
No	55	96.49%
Grand Total	57	100.00%

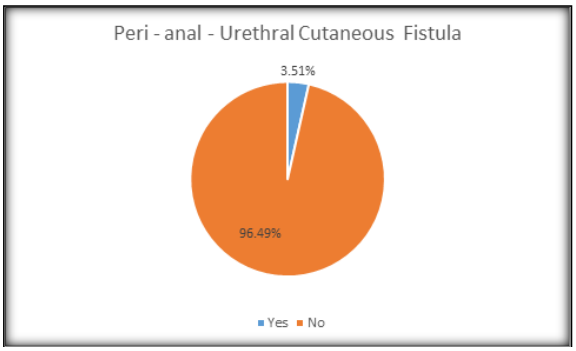
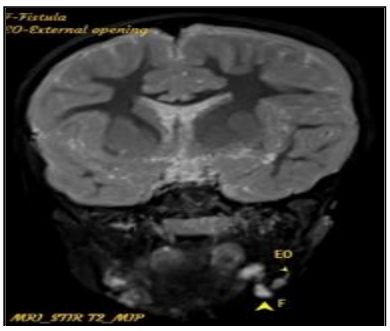


Figure 12: Broncho-Pleuro-Cutaneous-Fistula

Perianal urethrocutaneous fistula were 2 cases accounting for 3.51%.

CASES
CASE 1
LEFT 2nd BRACHIAL CLEFT FISTULA



A

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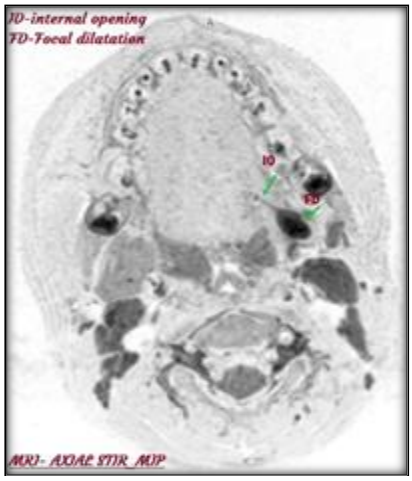

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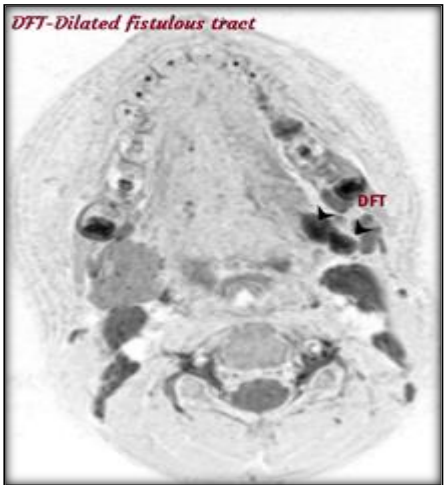
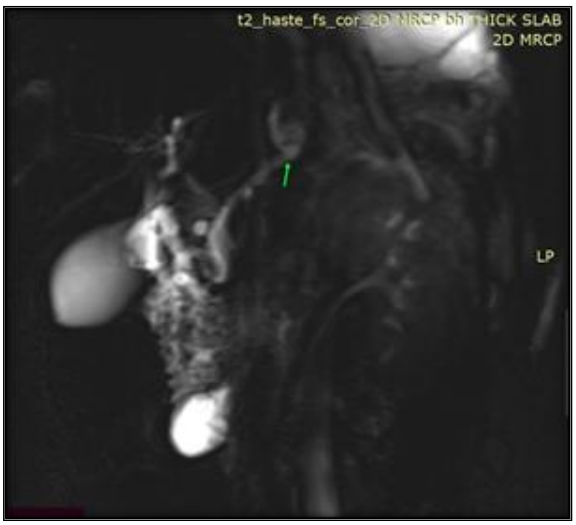


C

D

A (MRI STIR MIP IMAGE) B,C(AXIAL STIR MIP) ,D (AXIAL STIR MIP-Negative window) : shows fistulous communication between left side of neck and left tonsillar fossa.

CASE-2 PANCREATICOPLEURAL FISTULA



A

B

C

D

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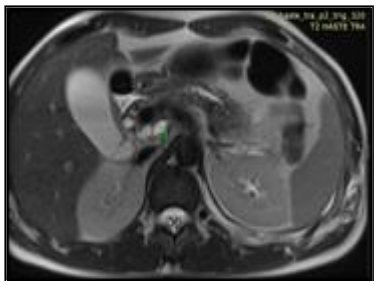
E

F

G



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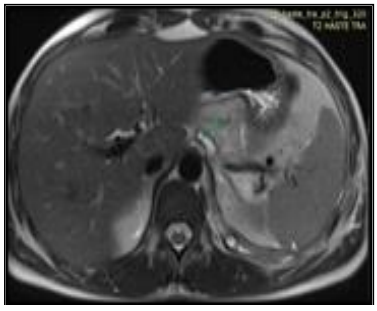

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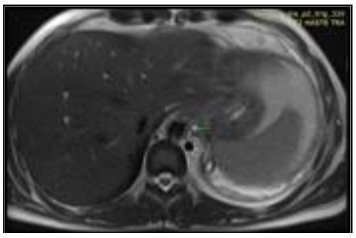

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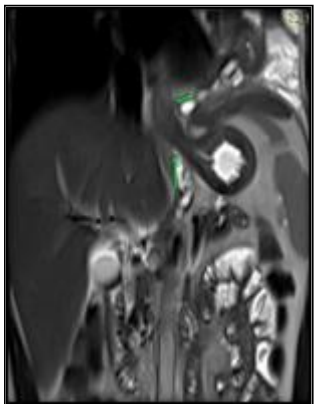
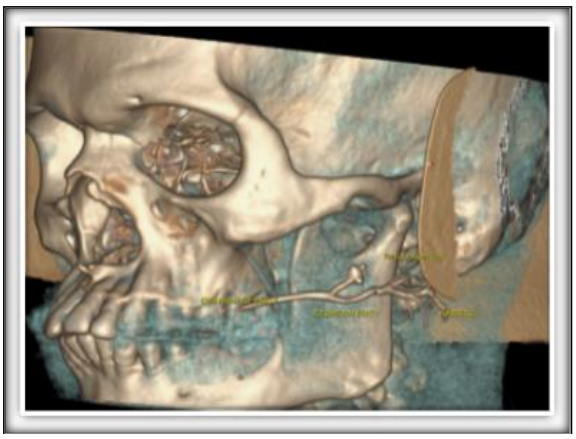


K

- B (SCOUT), C (CT AXIAL IMAGE ABDOMEN) – CHRONIC CALCIFIC PANCREATITIS CHANGES.
- F: LEFT MASSIVE PLEURAL EFFUSION WITH MEDIASTINAL SHIFT TO RIGHT SIDE.
- D AND E: POST ICD STATUS WITH STRAW COLOURED PLEURAL FLUID
- G: POST ICD CHEST XRAY
- A(T2 HASTE THICK SLAB) ,H(MRI SERIAL IMAGES) – SHOWS FISTULOUS COMMUNICATION FROM MAIN PANCREATIC DUCT AT NECK OF PANCREAS TO LEFT PLEURAL SPACE THROUGH AORTIC HIATUS OPENING.
- PLEURAL FLUID AMYLASE - 19,417IU/L

CASE-3 PAROTID -STENSONS DUCTOCUTANEOUS FISTULA



A

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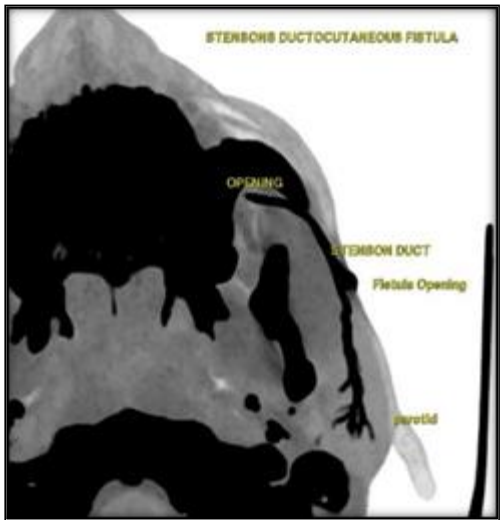
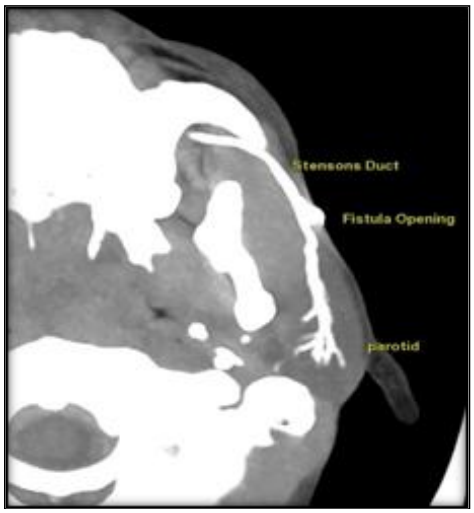


B



C

- CT FISTULOGRAM IN PATIENT CAME WITH COMPLAINS OF DISCHARGE THROUGH OPENING IN L CHEEK WHILE EATING FOOD (HISTORY OF TRAUMA +).
- A (VOLUME RENDERED IMAGE), B (NEGATIVE MIP IMAGE), C (MIP IMAGE): SHOWS A FISTULOUS TRACT COMMUNICATING WITH LEFT SIDE STENSON DUCT

CASE-4 – VESICO RECTO SIGMOID FISTULA

- Known case of CA ovary / postoperative status (total abdominal hysterectomy with bilateral salphingooopherctomy) - Patient has complaints of passage of fecal matter in urine while micturition

A

B

C

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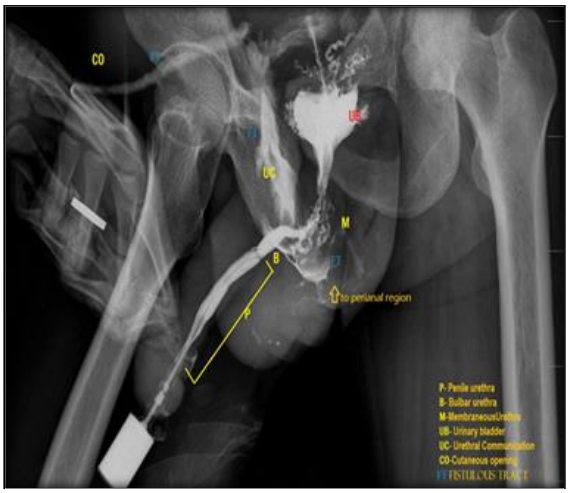
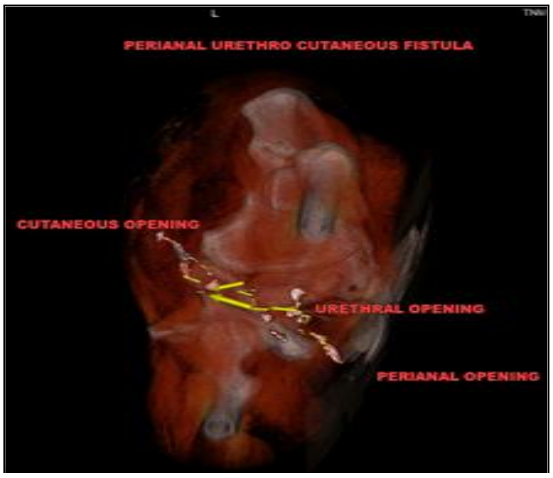
CT CYSTOGRAM
A (SAGITTAL IMAGE), B (SAGITTAL NEGATIVE WINDOW),
C (VOLUME RENDERED IMAGE)
fistulous communication noted between posterior wall of bladder in superior aspect and anterior wall of recto sigmoid.

CASE 5 PERIANAL-URETHRAL CUTANEOUS FISTULA

Referred as a case of Fistula in ano along with discharging sinus in suprapubic region.



A



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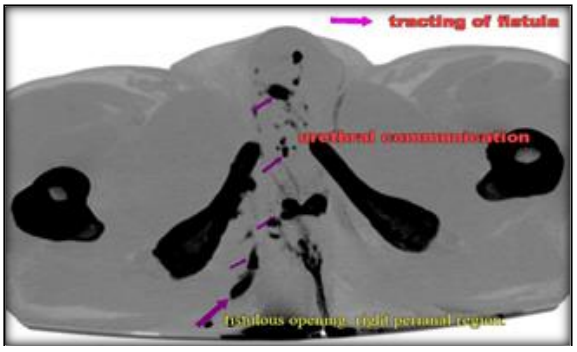

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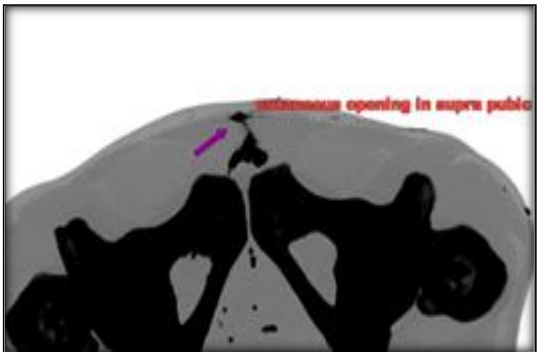

D

- A (Anterograde urethrogram –ANNOTATED IMAGE), B (VOLUME RENDERED IMAGE), C AND D (NEGATIVE MIP IMAGE): shows fistula tract communication between perianal region to urethra and inturn to supraregion.

CASE-6- VESICO-ENTERO-COLONIC FISTULA
K/C/O RECTO-SIGMOID GROWTH

A

B

CECT ABDOMEN (ORAL, IV AND RECTAL CONTRAST)
A (ANNOTATED SAGITTAL NEGATIVE MIP IMAGE PELVIC SECTION), B(AXIAL ANNOTATED NEGATIVE MIP IMAGE PELVIC

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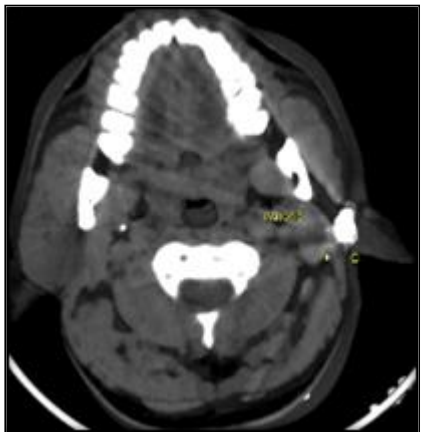
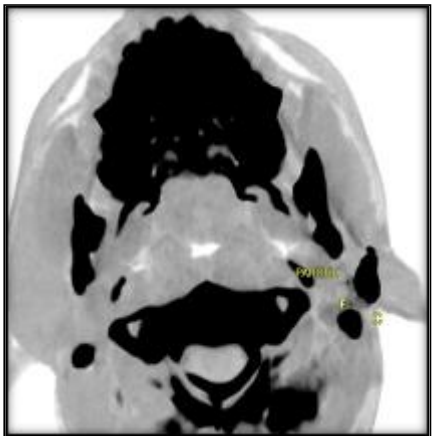
SECTION) : shows Fistulous tract between distal ileum,rectosigmoid and to urinary bladder.

CASE 7 -PAROTID DUCTOCUTANEOUS FISTULA
K/c/o OF WARTHIN'S TUMOR POST SUPERFICIAL PAROTIDECTOMY STATUS

- Patient complains of discharge from scar site while taking food



A



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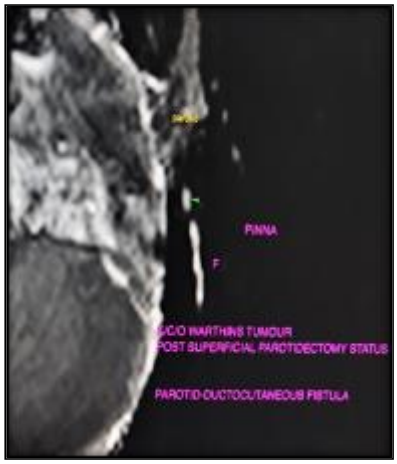
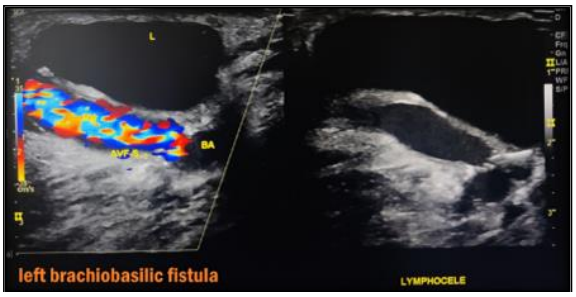


C

- A AND B (CT FISTULOGRAM – MIP AND NEGATIVE MIP IMAGES), C – DIFFUSION MRI AXIAL MIP IMAGE: shows fistulous tract extending from left postauricular region to intra parotid ducts.

CASE-8 LEFT BRACHIOCEPHALIC FISTULA WITH LYMPHOCELE
K/C/O CKD with Left Brachiocephalic fistula for haemo-dialysis



A

A (ANNOTATED DOPPLER IMAGE OF AVF) shows anechoic lesion without vascularity-possibly lymphocele

CASE-9 BRONCHOPLEURO-CUTANEOUS FISTULA
KNOWN CASE OF PULMONARY TB AND EMPYEMA – RIGHT SIDE

A

B

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C

A, B (CT AXIAL AND CORONAL IMAGE OF THORAX), C (NEGATICE MIP IMAGE OF CT CHEST): fistulous track from bronchus to pleura to cutaneous plane in right lateral chest wall.

CONCLUSION

Summary

- In this study, 57 cases of fistulas were studied in which Most Common Age Group was 35-45 having slight male predominance.
- Most common fistula in the study was fistula in ano and most commonly used to modality was MRI.
- In fistula in ano intersphincteric type was the most common one.
- Most common pancreatic fistula was pancreaticopleural fistula.
- Both brachiocephalic fistula and radiocephalic fistula were equally done in CKD patients for hemodialysis.
- Other rare cases such as parotid fistula, bowel related fistulas, bronchopleural cutaneous fistula and perianal urethrocutaneous fistula were demonstrated in this study.
- Most fistulas in the study were demonstrated using negative windows, maximum intensity projection images and volume rendered images.

As Radiologist it is imporatnt to get experienced with different types of fistula and their imaging in different modalities from conventional to magnetic resonance imaging.

This will pave a way for interventionist to plan their approach and management of fistulas. Even within various modalities it is important to know about various sub sectional windows such as negative. depending upon the pathologies and also how well be use volume rendering images effectively for better understanding of pathologies.

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