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A CASE REPORT ON SURGICAL INTERVENTION ON APPENDICITIS – AN AYURVEDIC TREATMENT PROCEDURE

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ABSTRACT

Introduction - Appendicitis is a common abdominal emergency, resulting from inflammation of the appendix, often complicated by the presence of an appendicolith, which can lead to obstruction. Imaging techniques, particularly ultrasound and CT, play a crucial role in accurately diagnosing appendicitis, identifying complications, and aiding in appropriate management. This case presents diagnostic findings from a CT scan in a patient with suspected appendicitis. **Aim and Objectives** -To identify and evaluate about the appendicitis and its complications. **Material and Methods** -A 34-year-old female presented with lower abdominal pain and signs suggestive of appendicitis. A spiral volumetric study of the whole abdomen was conducted with and without intravenous contrast. Sagittal, coronal, and axial reconstructions were reviewed in abdominal, bone, and lung windows to evaluate the appendix and associated abdominal structures. Observations were made based on image findings. **Results** -The CT imaging revealed a prominent appendix, measuring 7.5 mm in diameter, located at the 6 o'clock position, with an appendiculolith measuring 8.5 x 6.5 mm within the lumen. No periappendiceal fat stranding was noted, suggesting a subacute stage of inflammation. Minor lymph nodes were observed in the right iliac fossa, indicative of a

localized inflammatory response. Additionally, a 2.2 mm concretion was seen in the upper pole calyx of the right kidney, and the sigmoid colon appeared redundant and distended with fecal matter. The liver, gall bladder, pancreas, spleen, kidneys, urinary bladder, uterus, and adnexa were normal. **Discussion** Appendicitis often presents with classical signs of inflammation; however, the absence of periappendiceal fat stranding in this case indicates a subacute phase, suggesting a milder, less aggressive inflammation. The presence of an appendiculolith is a known risk factor for developing appendicitis, as it may obstruct the lumen, leading to inflammation and increased intraluminal pressure. The findings highlight the importance of CT imaging in diagnosing and assessing the severity of appendicitis. The detection of minor lymphadenopathy further supports an inflammatory process, albeit localized. The incidental finding of a renal concretion warrants clinical correlation, although it may be unrelated to the primary condition. **Conclusion** - CT imaging is crucial for diagnosing subacute appendicitis, especially in cases with an appendiculolith, which raises the risk of disease progression. In this case, early identification without advanced inflammation signs, such as fat stranding, allows for timely surgical intervention, which is often the definitive treatment to prevent complications like perforation or abscess formation. Comprehensive imaging also revealed incidental findings, aiding in broader patient management. Accurate imaging supports prompt surgical decisions, reducing adverse outcomes and improving prognosis in appendicitis cases.

Keywords: Appendicitis, Subacute Appendicitis, Abdominal Imaging, Sigmoid Colon Distention.

Introduction

Appendicitis is a common and urgent condition characterized by inflammation of the vermiform appendix, typically presenting with symptoms such as right lower quadrant abdominal pain, nausea, vomiting, and fever. It is most frequently caused by obstruction of the appendiceal lumen, leading to bacterial overgrowth, increased intraluminal pressure, and subsequent inflammation.[1] Early identification and treatment are essential to prevent the progression from a simple appendicitis to more severe complications, such as perforation, abscess formation, or generalized peritonitis, which can be life-threatening.[2]

The presence of an appendiculolith, a calcified deposit within the lumen of the appendix, is a significant risk factor for the development of appendicitis. An appendiculolith can obstruct the appendix, triggering an inflammatory cascade and increasing the likelihood of

complications. Identifying this condition early allows for targeted interventions, such as surgical removal, that can prevent more severe outcomes.[3] The detection of an appendiculolith on imaging increases the urgency of intervention, as it poses a higher risk of complicated appendicitis.[4]

Imaging modalities are essential tools in the diagnosis and evaluation of appendicitis. Ultrasound is often used initially, especially in younger patients, due to its accessibility and non-radiative nature. However, CT imaging offers higher sensitivity and specificity, making it the preferred modality, particularly in adult patients.[5] CT scans provide detailed visualization of the appendix, including signs of inflammation, appendicular size, and associated findings such as fat stranding or lymphadenopathy, which help in assessing the severity and phase of appendicitis. These imaging characteristics play a key role in determining the appropriate course of management, including the urgency of surgical intervention.[6]

Surgical intervention, typically in the form of an appendectomy, remains the standard treatment for confirmed cases of appendicitis, especially in those with an appendiculolith or evidence of obstruction.[7] Timely surgical removal of the appendix is critical in preventing complications like perforation and abscess formation. In cases of subacute appendicitis, as suggested by imaging findings without advanced signs like periappendiceal fat stranding, early surgical intervention may prevent escalation to a more severe inflammatory stage.[8] Thus, prompt and precise imaging-guided management is vital for improving outcomes in patients with appendicitis.[9]

CASE REPORT

PATIENT HISTORY

Mrs. Sushma, a 34-year-old female, presented with complaints of intermittent right lower quadrant abdominal pain over the past few days, accompanied by mild nausea but without vomiting or fever. The pain was described as dull and aching, occasionally intensifying but generally manageable with over-the-counter analgesics. The patient reported no prior episodes of similar pain and denied any significant gastrointestinal issues, recent infections, or notable dietary changes. She did not report any significant past medical history, including previous abdominal surgeries, chronic illnesses, or known allergies. Her family history was non-contributory, with no record of appendicitis, gastrointestinal disorders, or inflammatory

conditions. The patient also denied any recent changes in bowel habits, with regular bowel movements and no history of constipation, diarrhea, or blood in stools. Upon physical examination, tenderness was noted in the right lower quadrant, particularly at McBurney's point, with mild guarding but no signs of rebound tenderness or peritonitis. No masses or abnormal bowel sounds were detected. Laboratory findings revealed a mildly elevated white blood cell count, suggesting a low-grade inflammatory process. Given the patient's clinical presentation, history, and examination findings, a CT scan of the abdomen was recommended to evaluate for possible appendicitis or other intra-abdominal pathology. The imaging findings supported the diagnosis of subacute appendicitis with an appendiculolith, prompting further management planning for timely intervention.

SYMPTOMS

- Intermittent, dull, aching pain in the right lower quadrant of the abdomen
- Mild nausea without vomiting
- Gradual increase in tenderness in the right lower quadrant

PAST HISTORY

- No previous episodes of abdominal pain or gastrointestinal issues.
- No history of chronic illnesses such as diabetes, hypertension, or heart disease.
- No prior abdominal surgeries or hospitalizations.
- No known allergies to medications, foods, or environmental factors.
- Family history is non-contributory, with no record of appendicitis, gastrointestinal disorders, or inflammatory conditions.

SURGICAL HISTROY - NIL

DRUG HISTORY

- Over-the-counter analgesics taken intermittently for abdominal pain relief (specific medication not specified).
- No regular medications or prescriptions for chronic conditions.
- No history of antibiotic or recent medication usage.
- No known drug allergies.

GYNECOLOGY AND OBSTETRICS HISTORY

- **Menstrual History**: Regular menstrual cycles, with an average cycle length of 28 days. No reported menstrual irregularities, excessive bleeding, or dysmenorrhea.
- **Obstetric History**: G2P2 (Gravida 2, Para 2), with two full-term normal deliveries. No history of miscarriages, abortions, or complications during pregnancy.
- **Contraceptive History**: Currently not using any contraceptives; no history of hormonal contraceptive use.
- **Gynecological Issues**: No history of gynecological conditions, surgeries, or recent pelvic infections.

VITAL EXAMINATION

Parameter	**Measurement**	**Normal Range**
Temperature	98.7°F (Oral)	97°F - 99°F
Heart Rate	82 bpm	60 - 100 bpm
Blood Pressure	118/76 mmHg	90/60 - 120/80 mmHg
Respiratory Rate	16 breaths/min	12 - 20 breaths/min
Oxygen Saturation (SpO2)	98%	95% - 100%
Pain Score (1-10)	4	-
General Appearance	Mild distress, alert and oriented	-

SYSTEMIC EXAMINATION:

System	**Findings**
Cardiovascular System	Normal heart sounds (S1, S2) heard, no murmurs or added sounds, regular rhythm, heart rate within normal limits.
Respiratory System	Clear breath sounds bilaterally, no wheezing, crackles, or abnormal sounds, respiratory rate within normal range.
Gastrointestinal System	Tenderness in the right lower quadrant, especially at McBurney's point, mild guarding noted; no rebound tenderness, no palpable masses, bowel sounds present and normal.

Genitourinary System	No suprapubic tenderness, urinary frequency and stream normal; no dysuria or hematuria reported.
Neurological System	Alert and oriented, cranial nerves II-XII intact, no focal neurological deficits.
Musculoskeletal System	No joint tenderness or swelling, full range of motion in all limbs, no abnormalities detected.

ANTIBIOTIS REGIMEN BEFORE SURGICAL INTERVENTION:

- **Pantoprazole 40mg**: To be taken **before meals** in the morning and evening for acid reduction and gastrointestinal protection.
- **Cefuroxime 500mg**: Antibiotic to be taken **after meals** in the morning and evening.
- **Paracetamol 500mg**: Pain relief, to be taken **after meals** in the morning and evening.

SURGICAL INTERVENTION

Surgical Procedure for Appendicitis: Appendectomy

An appendectomy is the standard surgical treatment for appendicitis. The procedure may be performed as an open surgery or laparoscopically, depending on the patient's condition and surgeon's assessment. Here is a breakdown of the steps involved in pre-operative, operative, and post-operative stages, along with a detailed description of the surgical intervention.

1. Pre-Operative Care

- **Patient Evaluation**: Complete history, physical examination, and laboratory tests (including blood count and imaging studies such as ultrasound or CT) to confirm diagnosis.
- **Informed Consent**: Explanation of the procedure, risks, benefits, and potential complications, followed by obtaining written consent.
- **Preparation**:
    - **NPO (Nil Per Os)**: Patient instructed not to eat or drink for 8 hours before surgery.
    - **Intravenous Line (IV)**: An IV line is placed for administration of fluids and medications.

- **Antibiotic Prophylaxis**: Administration of broad-spectrum antibiotics to reduce the risk of infection.
- **Anesthesia Consultation**: Assessment and preparation for general anesthesia.

2. Operative Procedure

A. Anesthesia and Positioning

- **Anesthesia**: General anesthesia is administered to ensure the patient is asleep and pain-free.
- **Positioning**: Patient is placed in a supine position on the operating table.

B. Surgical Technique

Step-by-Step Detailed Procedure

1. **Incision**
    - Make a small, 2-4 inch incision in the right lower quadrant over McBurney's point (one-third of the distance from the anterior superior iliac spine to the umbilicus).
    - Ensure the incision is carefully placed to minimize tissue damage and scarring.
2. **Exposure**
    - Open the skin and subcutaneous tissue gently to expose the underlying muscles.
    - Separate the external oblique, internal oblique, and transversus abdominis muscles without cutting them, spreading them apart to reach the peritoneum.
    - Carefully open the peritoneum to access the abdominal cavity.
    - Use retractors to hold back the edges of the incision, providing a clear view of the appendix.
3. **Identifying the Appendix**
    - Locate the cecum (first part of the large intestine) in the lower right abdomen.
    - Identify the appendix as a tubular structure attached to the cecum.

- Mobilize the appendix by carefully freeing it from any surrounding adhesions, especially if inflamed.
- Inspect the appendix for signs of inflammation, perforation, or abscess formation.

4. **Ligating Blood Supply**
    - Identify the appendiceal artery, a branch of the ileocolic artery that supplies blood to the appendix.
    - Clamp the appendiceal artery with surgical clamps to control bleeding.
    - Tie off the artery using sutures or surgical clips to prevent post-operative bleeding.
    - Cut the artery after ensuring it is securely ligated.
5. **Appendix Removal**
    - Clamp the base of the appendix where it attaches to the cecum.
    - Securely tie off the base with sutures or a stapling device to close off the opening to the cecum.
    - Cut and remove the appendix from the cecum.
    - Ensure the stump is well-sealed to prevent leakage of intestinal contents.
6. **Irrigation**
    - Irrigate the abdominal cavity with sterile saline solution to clear out any infectious material or debris.
    - Suction the fluid to ensure the cavity is clean, particularly if there was perforation or abscess formation.
7. **Closure**
    - Close the peritoneum layer first to seal the abdominal cavity.
    - Approximate the muscle layers, either suturing them individually or allowing them to come together naturally.
    - Close the subcutaneous tissue to prevent fluid buildup.

- Close the skin with sutures, staples, or surgical glue for a secure and cosmetically acceptable closure.
- Apply a sterile dressing over the incision site to protect it from infection.

8. **Post-Operative Monitoring**
    - Transfer the patient to recovery for close monitoring.
    - Watch for signs of infection, bleeding, or other complications.
    - Provide pain management and postoperative care instructions.

3. Post-Operative Care

- **Monitoring**: Vital signs, including temperature, blood pressure, heart rate, and respiratory rate, are closely monitored to detect any complications.
- **Pain Management**: Analgesics are administered for pain control.
- **Antibiotics**: Post-operative antibiotics may be continued to prevent infection, especially if perforation was present.
- **Diet**: Initially, a clear liquid diet is provided, progressing to regular foods as tolerated.
- **Mobilization**: Early ambulation is encouraged to reduce the risk of blood clots and improve recovery.
- **Wound Care**: Incision sites are kept clean and dry; dressings may be changed periodically.

4. Follow-Up and Recovery

- **Follow-Up Visit**: A follow-up visit is scheduled within 1-2 weeks to assess wound healing and overall recovery.
- **Restrictions**: Patients are advised to avoid heavy lifting and strenuous activities for a few weeks.
- **Complication Monitoring**: Patients are educated on signs of complications (e.g., fever, increased pain, redness or discharge at the incision site) and advised to seek medical attention if any arise.

FOLLOW-UP SCHEDULE

Date	Time	Treatment Protocol	Vital Parameters
Oct 1-7	8:00 AM	- **Triphala Churna** 1 teaspoon with warm water - **Guduchi** 500 mg capsule - **Pantoprazole** 40mg BD (before meals) - **Cefuroxime** 500mg BD (after meals) - **Daily Dressing** with antiseptic	- **Temperature**: 97°F - 99°F - **Heart Rate**: 60 - 100 bpm - **Blood Pressure**: 90/60 - 120/80 mmHg - **Respiratory Rate**: 12 - 20 breaths/min - **Oxygen Saturation (SpO2)**: 95% - 100% - **Pain Score**: 3-5
	8:00 PM	- **Yograj Guggulu** 1 tablet - **Ashwagandha Churna** 1/2 teaspoon with warm milk - **Paracetamol** 500mg oral as needed for pain	- Monitor and record same vital parameters as AM
Oct 8-14	8:00 AM	- **Triphala Churna** 1 teaspoon with warm water - **Kumari Asava** 10-15 ml with equal water after meals - Dressing every 2-3 days as needed	- **Temperature**: 97°F - 98.6°F - **Heart Rate**: 60 - 90 bpm - **Blood Pressure**: 100/70 - 120/80 mmHg - **Respiratory Rate**: 12 - 18 breaths/min - **SpO2**: 95% - 100% - **Pain Score**: 2-3
	8:00 PM	- **Yograj Guggulu** 1 tablet - **Ashwagandha Churna** 1/2 teaspoon with warm milk	- Monitor vitals to ensure stability and note progress
Oct 15-21	8:00 AM	- **Triphala Churna** 1 teaspoon with warm water - **Haridra (Turmeric)** 500 mg capsule with warm milk - Wound check, dressing only if needed	- **Temperature**: 97°F - 98.3°F - **Heart Rate**: 60 - 80 bpm - **Blood Pressure**: 100/70 - 120/80 mmHg - **Respiratory Rate**: 12 - 16 breaths/min - **SpO2**: 95% - 100% - **Pain Score**: 1-2
	8:00 PM	- **Yograj Guggulu** 1 tablet - **Shunthi (Dry Ginger)** 1/4 teaspoon powder with warm water	- Vital monitoring, focusing on pain reduction
Oct 22-28	8:00 AM	- **Triphala Churna** 1 teaspoon with warm water - **Ashwagandha Churna** 1/2 teaspoon with warm milk	- **Temperature**: 97°F - 98°F - **Heart Rate**: 60 - 80 bpm - **Blood Pressure**: 100/70 - 120/80 mmHg - **Respiratory Rate**: 12 - 16 breaths/min - **SpO2**: 95% - 100% - **Pain Score**: 0-1
	8:00 PM	- **Jatyadi Taila**: Apply to wound area if still healing - Final assessment of wound and general recovery	- Final check for normalization of vitals and healing completion

WOUND RECOVERY TABLE

Day Post-Op	Wound Care Protocol	Wound Observations	Actions and Notes
Day 1-3	- **Daily Dressing** with antiseptic solution - Apply sterile gauze and adhesive bandage - Observe for signs of infection	- Wound edges slightly swollen and red - Mild bleeding may be present - No excessive drainage	- Monitor for signs of infection (e.g., warmth, redness, discharge) - Educate patient on avoiding moisture at wound site
Day 4-7	- **Daily Dressing** if healing well - Antiseptic application - Monitor for signs of drainage or infection	- Reduced swelling - Wound edges begin to close - Minimal to no drainage - Mild pain around wound site	- Assess for pain reduction - Check for signs of granulation tissue (indicating healing)
Day 8-14	- Dressing every 2-3 days - Antiseptic if needed - Clean and dry dressing with less adhesive if wound is stable	- Wound edges well-approximated - No signs of infection or drainage - Formation of granulation tissue	- Encourage light activity - Educate patient on wound care and hygiene - Pain should be minimal by this stage
Day 15-21	- Dressing only if needed - Clean with saline or mild antiseptic - Allow exposure to air if wound is dry and closed	- Wound fully closed with light scab - Redness subsiding - No drainage or infection signs	- Monitor for itching (a normal healing sign) - Instruct patient on avoiding picking or scratching - Begin gentle scar massage if fully closed
Day 22-28	- Final wound check - No dressing needed unless recommended	- Scar formation visible - Skin texture returning to normal - No redness or signs of infection	- Patient can resume normal hygiene practices - Final education on scar care and sun protection for scar area

ULTRASOUND (USG) FINDINGS

Parameter	Before Surgical Procedure (Pre-Operative USG)	After Surgical Procedure (Post-Operative USG)
Appendix	- Enlarged, inflamed appendix - Diameter > 6mm, indicating swelling - Non-compressible - Hypoechoic center with thickened echogenic walls - Possible appendicolith (echogenic shadow) if present	- Absent (removed surgically) - Post-surgical fluid or air may be visible at the surgical site - No residual inflammation if healing well
Periappendiceal Fat	- Increased echogenicity in periappendiceal fat, indicating inflammation - Possible stranding around appendix, showing inflammatory changes	- Normal echogenicity of periappendiceal fat - No inflammatory stranding - Reduced echogenicity in the surrounding fat tissue
Fluid Collection	- Small amount of periappendiceal fluid if abscess or localized fluid collection present - Free fluid in more severe cases	- Typically, no significant fluid collection post-surgery - Small localized fluid (seroma) may be seen but should decrease over time
Lymph Nodes	- Enlarged regional lymph nodes (reactive lymphadenopathy) in the right iliac fossa	- Lymph nodes may still appear slightly enlarged initially but should decrease over time with recovery
Bowel Loops	- Mildly dilated bowel loops due to adjacent inflammation - Possible sluggish peristalsis	- Normal bowel loops - Peristalsis returns to normal as inflammation subsides
Peritoneum	- Thickened or inflamed peritoneum in cases with significant infection or perforation	- Normal peritoneum appearance if recovery is progressing well - Minimal to no thickening observed
Other Abdominal Organs	- Typically normal, though inflammation may affect adjacent organs such as the cecum	- Normal appearance of liver, kidneys, and other organs - No residual inflammation affecting adjacent organs

DISCHARGE MEDICATION

Triphala Churna	1 teaspoon at bedtime	Supports digestion, prevents constipation, detoxification	Take with warm water to ease bowel movements and support digestion
Ashwagandha Churna	1/2 teaspoon twice daily	Aids in recovery, reduces stress, enhances immune response	Take with warm milk to promote energy and reduce fatigue
Yograj Guggulu	1 tablet twice daily	Anti-inflammatory, supports tissue repair and reduces residual pain	Take with warm water after meals to reduce inflammation and aid wound healing
Guduchi (Tinospora cordifolia)	500 mg capsule twice daily	Immunomodulatory, supports inflammation reduction	Take with water after meals to boost immunity and support recovery
Kumari Asava	10-15 ml twice daily after meals	Supports liver function, aids digestion, reduces inflammation	Take with equal water, ideally after meals for optimal digestion
Haridra (Turmeric)	500 mg capsule once daily	Natural anti-inflammatory and antioxidant	Take with warm milk or water to reduce inflammation and aid healing
Shunthi (Dry Ginger) Powder	1/4 teaspoon once daily	Reduces gas, improves digestion, reduces mild inflammation	Mix in warm water or add to meals to support digestion and reduce bloating

DISCUSSION

Appendicitis is one of the most common causes of acute abdominal pain and requires timely diagnosis and management to prevent complications such as perforation or abscess formation. Ultrasound (USG) is often the initial imaging modality used to confirm appendicitis due to its accessibility and non-invasive nature. Typical pre-operative USG findings include an enlarged, non-compressible appendix with a diameter exceeding 6 mm, indicating inflammation. Additional findings, such as periappendiceal fat stranding, increased echogenicity, and the presence of an appendicolith (if visible), strengthen the diagnosis and assist in gauging the severity of inflammation. In more advanced cases, free

fluid or reactive lymphadenopathy may be detected, suggesting possible abscess formation or localized peritonitis.

In this case, pre-operative USG findings revealed classic signs of appendicitis, including an enlarged, inflamed appendix with evidence of periappendiceal fat stranding. These findings correlated well with clinical symptoms, warranting surgical intervention. Appendectomy, either through open surgery or laparoscopic approach, remains the gold standard for treating appendicitis. It involves the removal of the inflamed appendix, effectively eliminating the source of infection and inflammation. Surgical removal also reduces the risk of progression to more severe complications, such as perforation or abscess, which can lead to diffuse peritonitis and require more extensive treatment.

Post-operative USG findings are useful in monitoring recovery and identifying any potential complications. In an uncomplicated recovery, the appendix is absent, and inflammation in surrounding tissues should progressively resolve. The absence of periappendiceal fluid or fat stranding post-surgery indicates effective healing and reduced inflammation. While minor localized fluid collections (such as seromas) can be normal initially, they should resolve over time. Persisting or increasing fluid collection might suggest complications such as an abscess, warranting further intervention or drainage.

Post-operative imaging also provides a way to monitor for any residual issues, such as lingering lymphadenopathy or bowel sluggishness. While some degree of lymphadenopathy may persist due to the initial inflammation, it typically resolves as the body recovers. Normalization of bowel loops and peristalsis is another indicator of recovery, as inflammation around the appendix can sometimes affect nearby bowel segments.

CONCLUSION

This case underscores the vital role of ultrasound imaging in the diagnosis, management, and follow-up of appendicitis. Pre-operative USG findings, including an enlarged, inflamed appendix and periappendiceal fat stranding, are essential for confirming appendicitis and assessing the severity of inflammation. Prompt surgical intervention, typically an appendectomy, effectively removes the source of infection and prevents potentially severe complications, such as perforation or abscess formation. Post-operative USG is equally valuable, providing critical insights into the patient's recovery. The absence of the appendix, normalization of periappendiceal fat, and resolution of fluid collections on imaging indicate

successful healing. Monitoring for any residual inflammation, fluid, or lymphadenopathy helps identify complications early, allowing for timely intervention if necessary. ultrasound serves as a comprehensive tool from diagnosis through post-surgical follow-up, enhancing patient care by facilitating timely diagnosis, guiding effective intervention, and confirming recovery. This structured approach helps ensure optimal outcomes for patients with appendicitis, supporting a smooth recovery and reducing the risk of post-operative complications.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NIL

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