

Review Article



Umbilical Discharge

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Abstract

An umbilical discharge is itself not a disease, but it is a symptom of many diseases. In children, it may be found to be associated with an underlying congenital abnormality like persistent OMD (Omphalo-mesenteric Duct) or Vitelline cysts or sinuses or umbilical granuloma or a diverticulum like the Meckel's diverticulum which may possess ectopic gastric or pancreatic or even colonic mucosa, or the persistent allantois or a urachal cyst or an infected urachus etc. Umbilical discharge though rare in adults, it may be caused by diverse congenital or acquired conditions. The most common causes of umbilical discharge in adults are such acquired conditions as pilonidal sinus disease, infection of hair tufts and foreign bodies⁴, and specific and non-specific acute and chronic inflammation and abscess of the umbilicus, infected omphalolith etc. Very rarely the discharge may be due to endometriosis or metastatic carcinoma, umbilical hernia ulceration etc. Discharging umbilical abscess may be caused by bacteria that can enter as a result of penetrating trauma, rupture of the bowel, or abdominal surgery. Irrespective of aetiology, umbilical discharge is a distressing condition for the patient and the family members. Appropriate diagnostic aids and successful management strategies are now available. If not associated with malignant diseases or irreversible complications, the prognosis is excellent.

Key words: OMD (Omphalomesenteric Duct), Omphalitis, Urachus, Urachal and vitelline cyst.

Date of received: 22.10.2021

Date of acceptance: 27.02.2022

DOI: <https://doi.org/10.3329/kyamcj.v13i1.59882>

KYAMC Journal. 2022; 13(01): 50-55.

Introduction

Umbilicus in adults is a mass of cicatrized tissue enveloped by infolding puckered skin having fissures, and is placed centrally in the anterior abdominal wall.^{1,2} The complex umbilical ring of the umbilicus is intimately related to the linea alba, the falciform ligament, the obliterated urachus (called the median umbilical ligament) and the umbilical fascia (called the Richet's fascia), leveling at L4 and L5 intervertebral disc, but at a lower location on infants.³⁻⁵ It is described as a water-shed area for venous and lymphatic flow - above the umbilicus, they flow to the axillary vessels and below to the vessels at inguinal regions.⁶ The umbilicus is supplied by nerves from the T10 spinal cord segment.^{6,7} The umbilicus is the junctional point of four folds of the embryonic plate and three systems.⁸ These systems are the gastro-intestinal (vitello-intestinal/ vitelline/ OMD-omphalomesenteric duct connecting the developing midgut with the yolk sac), the urinary (the fibrous remnant urachus of the allantois/ allanto-enteric diverticulum) connecting the develop-

ing bladder apex with the yolk sac) and the vascular (two umbilical arteries and one umbilical vein), embedded in the Wharton's jelly during the intrauterine life. Umbilical discharge is a normal or abnormal flow of liquid or semisolid material from the umbilicus.⁹⁻¹¹ Normal umbilical discharge in neonatal life is usually very very small and consisting of clear mucoid secretions. Sometimes it forms a scab. When it heals up, the scab falls off on its own.¹² The neonatal navel has a small risk of getting infected. Otherwise umbilical discharge is a symptom of an underlying umbilical disease or intra-abdominal pathology. Pathological umbilical discharges may be cloudy or purulent or bloody or fraudulent or uriniferous.^{11,13,14} It may be associated with primary or secondary malignant lesions. Abnormal and pathological umbilical discharge can occur at any age starting from the neonatal life to senile life till death. Persistence of whole or part of the OMD/VD (Vitelline Duct) or allantois or infection of these structures or their remnants are usually associated with abnormal and pathological umbilical discharges.¹⁵ The vessels within the umbilical cord of neonates are soon converted

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in adults to connective tissue ligaments that divide up inside the liver making various anatomical sections of liver and that remain attached to the inner aspect of the umbilicus lifelong. These connective tissue ligaments along with their accompanying vessels can act as a route to convey pathology to & from the umbilicus.^{14,16} Abnormally menstrual discharge can flow through the umbilicus. Primary or secondary endometriosis may be associated with hemorrhagic umbilical discharge. Umbilical discharge in infancy often follows infection or an umbilical granuloma (small red lumps) covered in a clear discharge. Infection of umbilical granuloma may be dangerous and life-endangering. Umbilical discharge may follow umbilical hair tufts with or without infections, pilonidal sinuses, foreign bodies (FBs), Omphalitis (inflammation of the umbilicus) etc. Several other benign and malignant diseases of the umbilicus include infected omphalolith (inspissated umbilical bolus or simply umbilical bolus) that may be seen as an uncommon disease-causing umbilical discharge.^{17,18}

Historical Aspect

The understanding of umbilical embryology and the clear basis for surgical correction of umbilical abnormalities had been well documented for over 100 years. Abdominal wall anomalies and defects, Umbilical hernias, umbilical polyps (intestinal mucosal prolapse /umbilical adenoma/raspberry tumour) and drainage,¹⁰ and OMD and its remnants are well described. Management strategies in some of these disorders, like treatment of umbilical granuloma with silver nitrate chemical cautery, have changed little over the last century. In the early 1900s, umbilical hernia surgery had been a challenging procedure. Spontaneous closure of many of these hernias and preservation of the beauty of the natural umbilicus had been well recognized by this time. Now, umbilical hernia surgery is a very common surgical procedure having excellent outcome.^{14,15,17}

Epidemiology

The frequencies of different umbilical disorders are variably described in different studies. The overall current incidence of omphalitis in developed countries is between 0.2 and 0.7%, and in developing countries, it varies from 2 to 7 per 100 live births. There is no sex or racial or ethnic predilection. Umbilical infections are now detected in less than 1% of hospital-admitted neonates. Like many infections, omphalitis is more common in immuno-deficient, immuno-compromised and immunosuppressed patients or who are have undergone invasive procedures. Thus, premature or infected infants are at higher risks. Infants having competent and normal immune systems are at risk if they were born with prolonged delivery or having umbilical catheters or are complicated with chorioamnionitis. Umbilical hernias are usually diagnosed in very early life, but most of these close spontaneously. No sex predilection has been unanimously described. The incidence at 1 year of age ranges from 2 to 15%. The incidence is higher in black infants, especially those who are born with low birth weight, Trisomy 21 (Down's syndrome), trisomy 13, trisomy 18, or Beckwith-Wiedemann's overgrowth syndrome.^{5,17,18}

Aetiology

The umbilical discharge itself is not a disease entity. Rather it is a symptom of underlying pathology of a spectrum of many diseases.

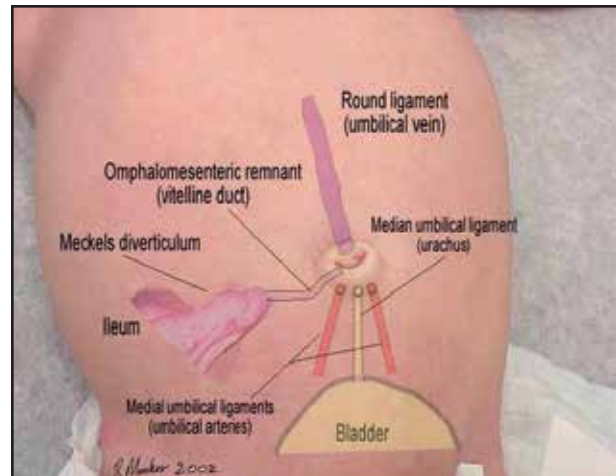


Fig: Anatomic relationship between the umbilicus and its embryological attachments. (Courtesy: Media Gallery of MED-SCAPE).

Aetiologically these diseases may be classified as congenital embryonal anomalies (e.g., persistent VID -Vitello-Intestinal Duct) and acquired (e.g., Omphalitis). The acquired one may be inflammatory (e.g., Omphalitis, Umbilical granuloma, Pilonidal sinus etc.), infective (that may be specific or nonspecific), endometriotic (primary or secondary), postoperative (as following laparotomy for abdominal exploration or surgery), neoplastic, fistulated (as in patent VID consisting of the fecal fistula or patent urachus consisting of urinary fistula, or other abdominal fistulas resulting from neoplastic infiltration or ulceration or tuberculous peritonitis, ulcerated umbilical hernia and ulcerated umbilical calculus(omphalolith) etc. The neoplastic one may be benign (fake tumour like umbilical adenoma or raspberry tumor, endometrioma etc.) or malignant. The malignant one may be primary (as of umbilicus itself, though rare, e.g., umbilical malignant melanoma) or secondary (as metastatic Sister Joseph's nodule through lymphatics of the round ligament from intra-abdominal malignancies like those from stomach, colon, ovary, uterus, omentum etc., sometimes hematogenous spread from breast cancer etc.^{5,7,15,17}

Pathology

Pathology is variable dependent on aetiology.

Omphalitis is inflammation with or without infection of the umbilicus, commonly seen in neonates, but no age is immune. Severed umbilical cord just after birth may contain bacteria like staphylococci in 50% cases, streptococci, E. coli, Corynebacteria, Actinobacteria, Bacilli, clostridial including C. tetani etc. This infection usually follow poor asepsis and poor hygiene. The infection may extend along vessels to cause regional abscesses or into the peritoneum causing peritonitis resulting in septicemia and complications thereof in severe cases. Once localized, infection may cause umbilical abscess and umbilical granuloma. The inflamed umbilicus get red colored and swollen usually with a purulent discharge if infected with pyogenic organisms. Cutaneous crusts or scabs, pungent odour or foul smell, pruritus may be present. Umbilical discharge may be clear or colored or cheese-like or blood-stained or frankly hemorrhagic when bacteria, fungi or yeast may also be identi

fied. Diabetic patients are more prone to get their umbilicus infected with bacteria, fungi, yeasts etc.^{9,10}

Abdominal surgery: Any patient having recent abdominal surgery may present with umbilical discharge indicating internal infection or disorder that has implicated the umbilicus.¹²

Infected navel stone (omphalolith or umbolith) may present as an umbilical discharge.¹⁷

Umbilical lint (a combination of body hair, skin cells, and clothing fibers) can invite infection leading to umbilical discharge. Sebaceous cysts are also a cause of belly button discharge in some cases. The sebaceous glands in or near the umbilicus may get packed up and clogged with dirt and oils that on getting an infection can cause umbilical discharge.^{4,11}

Umbilical granuloma results from chronic infection of the umbilicus where red, swollen, tender granulation tissue is found to pout that bleeds on touch, presenting as umbilical discharge. No age is immune but more common in infants & children.^{1,6}

Anomalous VID that includes 1. totally patent VID to form frank faecal intestinal fistula, 2. partially patent at umbilical end as discharging umbilical sinus, 3. umbilical adenoma (raspberry tumour/intestinal mucosal prolapse) when the epithelium and the associated mucosa protrudes or everts, 4. intra-abdominal cyst following closure of the VID on either side, 5. obliterated vitello-intestinal band (VIB) that may be responsible for intestinal obstruction, volvulus and internal herniation, 6. Meckel's diverticulum as the patent intestinal part or end of the VID, which may remain connected with the umbilicus by the obliterated portion as a fibrous band, (the Meckel's diverticulum itself can cause diverticulitis, obstruction, ulceration, bleeding, perforation etc.).^{8,13,18}

Anomalous urachus that includes 1. totally patent urachus/allantois/allanto-enteric diverticulum (the urachal fistula) connecting the umbilicus with the dome/apex of the urinary bladder to discharge uriferous fluid, 2. totally obliterated urachus/allantois as fibrous median umbilical ligament, 3. urachal sinus if only umbilical part of the urachus is patent, 4. urachal cyst if only the mid-portion having a lining is patent and contain fluid, 5. urachal diverticulum when the urachus is patent at its vesical part. These anomalies can cause persistent discharge of urine or pus or blood if infected, recurrent or persistent umbilical pain, recurrent urinary infection etc.^{9,15}

Umbilical sinus characterized by pain, tenderness, swelling and discharge, can result from persistent VID or urachus at their umbilical side or from tuberculosis or umbilical infection or infected omphalolith (umbolith) or pilonidal sinus of the umbilicus or malignancy etc.¹⁰

Umbilical adenoma (patch of Vitello-Intestinal epithelium left behind at umbilical end when the VID closed internally)/Intestinal mucosal polyp (Raspberry tumour) is commonly found in infants due to patency of the VID at its umbilical side and usually associated with obliteration of the rest part of the VID. It appears as protrusion or prolapse of the epithelial lining the

mucosa as mucus-moist red swelling that usually bleeds on touch. When infected, it causes pyogenic discharge.^{6,13}

An umbilical fistula may be post-surgical or may be caused by patency of VID or urachus or by tuberculosis or internal malignancy etc. There may be faecal or uriferous or mucoid or haemorrhagic discharge in accordance to the aetiology. An umbilical faecal fistula is usually an abnormal passage between the intestines and the umbilicus causing fecal matter to escape from it. Abnormally menstrual blood may flow through the umbilicus. Umbilical discharge is almost invariably associated with peri-umbilical dermatitis, blistering and excoriation. This dermatitis is due to irritation of skin by acidic or alkaline secretions from ectopic gastric mucosa or intestinal mucosa present in the OMD or infected cyst. Both discharge and dermatitis get resolved following surgery. Pain, tenderness, recurrent infection and peri-umbilical excoriation are common associated findings.⁶⁻⁸

Umbilical Pilonidal Sinus (UPS) commonly presents with pain and umbilical discharge. Mostly common in young active adolescent males especially who have dense hairy abdomen. People with a deep umbilicus are at a higher risk of acquiring UPS.³

Ulcerated umbilical hernia may appear with discharge. Complications from an umbilical hernia surgery are not very uncommon, that may include wound infection, when it may appear red, swollen often with painful yellow discharge.¹¹

Umbilical endometriosis: Rupture or infection of or surgical intervention on an umbilical endometriotic nodule can lead to an umbilical haemorrhagic discharge, especially during menstruation. Primary umbilical endometriosis is said to occur spontaneously without any surgery or instrumental delivery. Secondary umbilical endometriosis (sometimes also known as scar endometriosis) is associated with previous known pelvic or abdominal surgery or instrumental delivery. Primary umbilical endometriosis is less common than secondary umbilical endometriosis. Only a few patients presenting without a history of surgery or trauma or instrumentation as in obstetrics can present with their primary umbilical endometriosis.^{14,15}

Complications

Abscesses (Abdominal wall, liver, intra-abdominal or other tissues/organs/spaces, because of local, lymphatic or haematogenous spread); Ulceration and subcutaneous gangrene of the abdominal wall, Septicemia and complications thereof, Peritonitis, Shock, Umbilical hernia, Tetanus, Portal pyaemia, Portal vein thrombosis (PVT), Portal hypertension (PH), Hepatitis, Cholangitis etc.^{12,13,16,17}

Diagnosis

Diagnosis as to the cause of umbilical discharge (I.e., the underlying disease) is to be arrived at by taking adequate history, deliberate physical examination and laboratory investigations. In addition to routine laboratory investigations, Specific diagnostic and special evaluative investigations include 1. Study of the discharge: Cytology, biochemical study, gram's staining, AFB staining, culture for aerobic and anaerobic organ

isms and also for mycobacteria, and relevant sensitivity tests of discharge, PCR or DNA probe tests when indicated, 2. FNAC (Fine Needle Aspiration Cytology), 3. Biopsy and Immuno-histochemistry when indicated, 4. USG, 6. Elaborate urine analysis, 7. Fistulogram, 8. CT scan, 9. MRI scan etc., 10. Tumour markers, 11. Serum ADA, 12. ICT for tuberculosis, 13. Mycodot test for tuberculosis, 14. Serum for Anti-TB IgG, IgM, IgA (TB complex/The Anti-TB test) etc.^{1,2,17,18}

Discussion

Normally umbilicus is indented with fissures so to act as a trap for sweat, dead skin, dirt, dust, bacteria, fungus, yeasts (especially candida Albicans) and other germs get easily trapped inside, where microbes grow and infect easily, especially in poor hygienic condition leading to umbilical discharge with bad smell.¹⁵

During infancy, umbilical discharge is often ascribed to umbilical granuloma or infection. It is essential to explore if such an umbilical discharge is due to a congenital anomaly as corrective surgery is possible.¹⁶

OMD remnants may present as umbilical abnormalities, intestinal obstruction, acute abdomen, and painless P/R bleeding etc. Umbilical abnormalities are normally present during infancy to late childhood. A study comprising 217 children with OMD abnormalities had shown that about 40% of these lesions were symptomatic, and amongst these, 80% had presented in the first 2 years of life (D. W. Vane et al)². In another study, 59 children presenting with asymptomatic OMD remnant during a 17-year period in a tertiary pediatric surgery unit had been reviewed (C. U. Durakbasa et al)³. In the latter study, 36% of Patients had been seen to have presented with GIT obstruction, 31% with acute abdomen, 29% with umbilical abnormalities, and 5% with per rectal bleeding. Ectopic tissue was detected in 31% of cases, of which gastric mucosa cases were 25%. Patients with umbilical abnormalities had prolapse around 17%, faecal discharge around 29%, an umbilical polypoid mass around 23%, and umbilical cord hernias around 17% that contained Meckel's diverticulum. Umbilical cysts as OMD remnants are rarely seen. This review had reported 2 cases of umbilical cysts, one in a 6-year-old child who presented as an umbilical mass (M. Iwasaki et al)⁴ and another in a 2-year-old girl who presented as an umbilical nodule (I. Ballester).⁵

The rate of detection of ectopic tissue in VID remnant is higher in symptomatic cases. The most commonly detected ectopic tissues are of gastric or pancreatic origins, although other tissues like colonic mucosa can also be seen (C. U. Durakbasa et al)³. This similar type of sharing is also seen in GI duplications (R. I. Macpherson).⁶ The acidic discharge causes skin appearance of chemical dermatitis. Ectopic gastric mucosa may produce physiologically enough acid to lead to inflammation and subsequent ulceration, that may cause hemorrhagic discharge. Many publications had confirmed abdominal pain because of ectopic gastric mucosa in the gall bladder, rectum, or appendix mimicking appendicitis (E. Bender and S. P. Schmidt).⁷ Umbilical discharge per se may be a symptom of a spectrum of multiple pathologies (M. S. Martin and R. M. Lembo).⁸ Umbilical granuloma is the commonest cause of

umbilical discharge which is successfully treated with topical silver nitrate. If there are continued symptoms despite treatment with silver nitrate, other differential diagnoses like persistent urachus and omphalo-mesenteric duct remnants are to be considered earlier and relevant investigations should be done. That includes US and Meckel's scan. US is the prime investigation to identify congenital abnormalities of the umbilicus (A. E. Boothroyd and R. E. Cudmore)⁹ to have subsequent appropriate intervention.

Preventive measures to prevent the development of umbilical discharge

Umbilical discharge is largely a preventable condition following the methods as described: 1. The umbilicus should be cleaned each day using soap and warm water; 2. After each bathing or showering, the umbilicus should be dried well; 3. Using the index finger underneath the washcloth soaked with antibacterial soap, the inside of the umbilicus is cleaned daily during bath/shower. After getting out of the shower, the umbilicus is wiped to dryness. 4. Built-up sebum oils, soap scum, or lint should be removed from the umbilicus throughout the day; 5. Avoiding picking and scratching at the umbilicus; 6. Avoiding of wearing tight clothing; 7. Loose-fitting clothing should be made from natural fibers to have better skin breath; 8. Over-the-counter products, Creams, and moisturizers should not be used for the umbilicus unless prescribed by qualified physicians; 9. Umbilical jewelry and piercing should be regularly cleaned to avoid infection. 10. Aseptic technique during ligating and dividing the neonatal umbilicus just after birth to prevent infection, sepsis and discharge.^{8,9}

To keep the umbilicus neat and clean, considering the sensitivity of skin, one can use water, normal saline or hydrogen peroxide. A cotton swab soaked with a cleansing agent is to be used gently to wipe the umbilicus.¹²

Patients who are being recovered from abdominal surgery should be cared for any signs of infection in the umbilicus to undertake appropriate measures.¹¹

Treatment

Treatment of umbilical discharge is principally directed to the cause of discharge, i.e., the underlying disease. Each cause of the umbilical discharge is to be identified and treated specifically.

Antibacterial and antifungal ointments and creams are often used to treat umbilical discharge, depending on the causative organism.³

For treatment of omphalitis, umbilical abscess or sepsis, antibiotics are to be initially chosen empirically. But they are best chosen following culture and sensitivity reports.⁶

An umbilical abscess needs to be adequately drained and regularly dressed aseptically till healthy young vascular granulation tissue is found. Excessive granulation tissue is to be surgically excised or removed by chemical cautery using mostly small amounts of trichloroacetic acid or silver nitrate or copper sulfate etc.⁵

An umbilical granuloma needs to be treated by ideal antibiotics and cauterization by silver nitrate and daily dry dressings etc. Occasionally, it may need surgical removal, or rarely umbilectomy.⁹

Anomalous VID needs to be treated by surgical excision, along with resection of the Meckel's diverticulum containing intestinal segment and end to end anastomosis to restore intestinal continuity. Sometimes one may perform excision of the VID up to the anti-mesenteric surface/side of the bowel when the opened bowel segment can be closed by transverse sutures using vicryl or dexon.^{13,14}

Patent urachus is best treated by surgical excision and closure of the opened bladder apex by double-layer sutures.⁷

In most of the umbilical fistulas including umbilical discharging lesions, umbilical excision is very often worthwhile. Other specific treatment of umbilical sinus is specifically directed to its cause, e.g., treatment of the persistent VID or persistent urachus or umbolith or tuberculosis or any other form of infection or pilonidal sinus or malignancy if any etc. along with suitable ideal antibiotics. Very often, umbilectomy is required.⁵ Umbilical raspberry tumour (so called adenoma/mucosal prolapse) is not a true tumour. It can't be abolished by silver nitrate cautery. If it is pedunculated, a firm ligature using prolene or silk can be applied just close to its base, when the so-called tumorous adenoma is expected to fall off within a few days. If it reappears, umbilectomy is indicated. If it is associated with patent VID, a specific surgical approach needs to be performed accordingly as for the patent VID.³

A discharging cyst or fistula must be radically excised. Here laparoscopic or laser surgery may be more worthwhile to remove the pathology radically.^{2,18}

Prognosis

Complete healing from umbilical infection, if not associated with fistula or malignancy or TB may take 9 to 12 months. The outcome for patients having embryologic remnants with or without umbilical hernias is generally excellent. No residual problems are usually expected to occur after successful treatment. However, Rosen et al suggested that umbilical hernia repair may increase the incidence of functional gastrointestinal disorders in childhood.¹⁵ Contrariwise, in most other series, omphalitis complicated with necrotizing fasciitis is associated with higher mortality, maybe as high as 80%. Necrotizing fasciitis can also lead to Portal pyemia, PVT (Portal Venous Thrombosis) and portal hypertension.

Conclusion

Preventive measures need to be taken to prevent umbilical infection and umbilical discharge. Congenital lesions and anomalies of the umbilicus are to be diagnosed and treated as soon as possible in early life to protect the patient from unwanted suffering. Umbilical discharging lesions in adults who are refractory to standard treatment need to be investigated for internal or occult pathology.

Acknowledgment

We are very much grateful to Prof. Dr. Md. Zulfikar Ali of the Department of Medicine and Gastro-enterology of Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj for his utmost inspiration and encouragement in preparing this review article entitled 'Umbilical Discharge' for publication in this esteemed journal.

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