



## Original Article

# Etiology of Umbilical Discharge in Children and its Management in a Tertiary Care Hospital

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### ABSTRACT

*Umbilical discharge is not an unusual presentation in infant and children. It is a symptom of varied pathology. This prospective interventional study was conducted in the Department of Paediatric Surgery, Sylhet MAG Osmani Medical College Hospital, Sylhet during the period of 2 years from January 2013 to December 2014 to find out the causes and the management of umbilical discharge in children. A total of 46 patients aged up to 12 years admitted or attended in outpatient department with umbilical discharge were selected. Patients were diagnosed by history, examination and investigations. The age of the patients ranged from 4 days to 11 years with a mean age of 1.46 (SD±2.48) years. Majority (69.6%) of the patients were below the age of 12 months. Male female ratio was 1.9:1. Out of 46 patients, 4 (8.7%) had other associated congenital anomalies. Early separation of umbilical cord (within 7 days) was significantly associated with umbilical discharge ( $p=0.008$ ) and umbilical adenoma (41.3%) was the commonest cause of umbilical discharge. Majority (56.5%) of patients were treated surgically and 43.5% patients received medical treatment. The outcome was excellent in 42 (91.3%) patients; while 3 (6.5%) patients developed some form of complications and one patient died due to septicaemia. So, it may be concluded from the study that umbilical adenoma is more common than umbilical granuloma in children although literature review reveals granuloma is the commonest.*

**Keywords:** Umbilical discharge, Granuloma, Adenoma.

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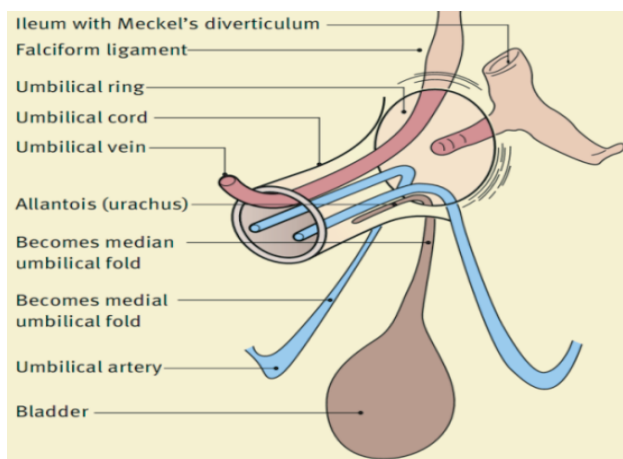
### INTRODUCTION

The umbilical cord is the main portal for entry and exit of blood from the placenta to the fetus during intrauterine life. In addition to the paired umbilical

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arteries and umbilical vein, the umbilical cord also contains the vitelline or omphalomesenteric duct and the urachus. Usually, the vitelline duct obliterates by 5<sup>th</sup> to 9<sup>th</sup> week of gestation and the urachus obliterates to become the median umbilical ligament by the 4<sup>th</sup> to 5<sup>th</sup> month of intrauterine life. After birth, the umbilical cord withers and separates, leaving no remnants. Umbilical abnormalities can arise when embryological remnants persist or fail to completely involute<sup>1,2</sup>.



**Figure-1:** Structures at the umbilical ring and in the umbilical cord<sup>3</sup>.

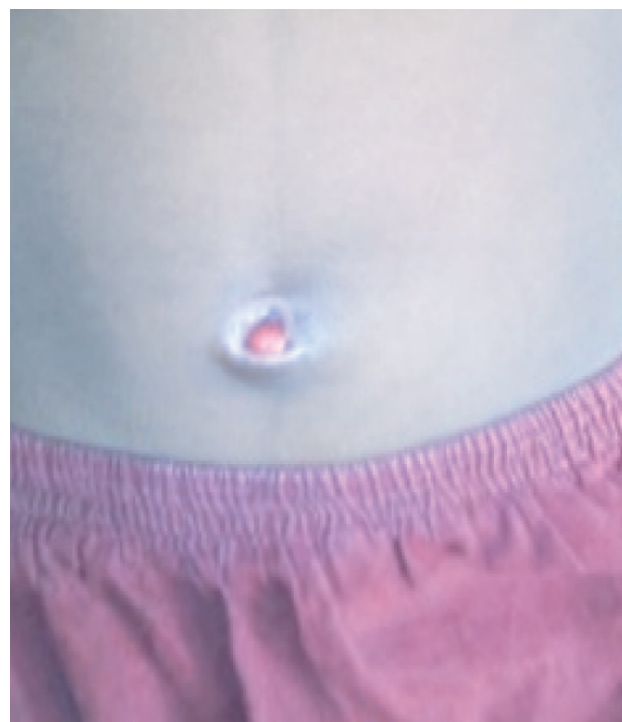
In the newborn, the umbilical cord typically desiccates and separates within 7 days, leaving a dry, "star-like" central abdominal scar that forms the umbilicus. In general, any cord that persists after 3 weeks represents delayed cord separation. Delayed cord separation can be associated with infection, urachal abnormality or immune deficiency<sup>4,5</sup>.

There are various type of umbilical disorders which manifest as umbilical discharge, swelling, mass, abdominal pain etc. Persistence of umbilical discharge may be due to omphalitis, umbilical granuloma, umbilical adenoma, patent vitellointestinal duct (PVID), patent urachus (PU) and sometimes laparoscopic port infection. Umbilical discharge is most often due to an umbilical granuloma that present as minimum discharge with moist, raw, reddish-pink tissue arising from the base of the umbilicus after separation of the umbilical cord (Figure-2A). Its incidence is 1 in 500 births and is treated surgically and non surgically<sup>6</sup>. Non surgical method is chemical cauterization with silver nitrate, copper sulphate or common salt<sup>4,7</sup>. Sometime umbilical granuloma is difficult to distinguish from an umbilical polyp which is usually bright red, slightly larger and represents remnant of vitellointestinal duct (VID) or urachal tissue (Figure-2B). Umbilical polyp does not respond to cauterization. After excision, histopathology should be performed to rule out embryological remnants<sup>7,8</sup>.

PVID is one of the complications of incomplete obliteration of the vitelline duct (omphalomesenteric duct) with an incidence varying from 1 in 5,000 to



**Figure-2(A):** Umbilical granuloma.

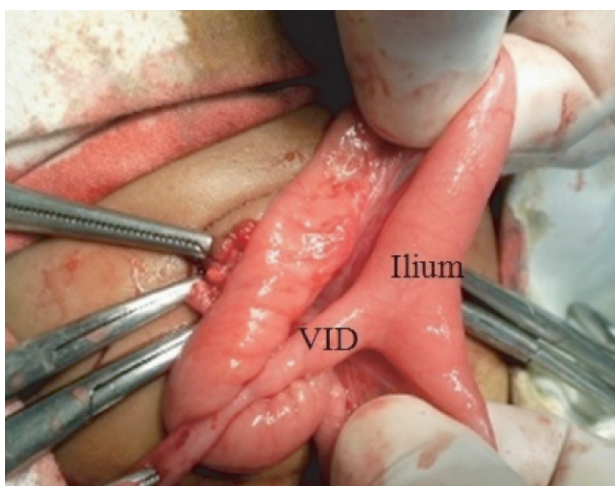


**Figure-2(B):** Umbilical adenoma.

8,000 live births. It usually presents as feculent or serous discharge through the umbilicus<sup>9</sup>. PU is a communication from the umbilicus to the bladder and is a rare disorder with an estimated incidence of 1 to 2 per 100,000 deliveries<sup>9</sup>. It is due to failure of complete obliteration of urachus and presents as leaking of urine through the umbilicus. Lower urinary tract obstruction may also be a contributory factor. Surgery is the mainstay of treatment for PVID and PU.



**Figure-3(A):** Umbilical sepsis.



**Figure-3(B):** Per operative picture of patent VID.

Omphalitis is infection of umbilicus that manifests as purulent or foul smelling discharge from the umbilicus or umbilical stump, periumbilical erythema, oedema etc. Most of these are usually treated by regular dressing and systemic antibiotics. When complications such as necrotizing fasciitis, myonecrosis, intra-abdominal abscess, peritonitis etc. arise then surgery is the treatment of choice. Incidence of omphalitis in developed country is 0.2-0.7% and in developing country is a significantly higher as 2-4%<sup>10</sup>. No surgery is without complications. It is also true for laparoscopic operation, but these are rare. The various port site complications are infection (1.02%), discharge (1.41%), bleeding (0.7%), wound dehiscence, subcutaneous emphysema (0.58%) and port site hernias (0.47%). Port site complications can be reduced by

improvement of access technique, instruments and surgical expertise. Port site discharge and infection can be reduced by aseptic techniques and use of prophylactic antibiotics<sup>11</sup>.

Any discharge, mass, or sinus tract is pathological and should be appropriately evaluated and treated. Therefore it is necessary to have clear idea about the causes of umbilical discharge and its management. There are studies on umbilical discharge in western country and south Asia. But till now very few literature exists about the umbilical discharge and its management in Bangladesh. So this study was designed to find out the etiology of umbilical discharge and its management.

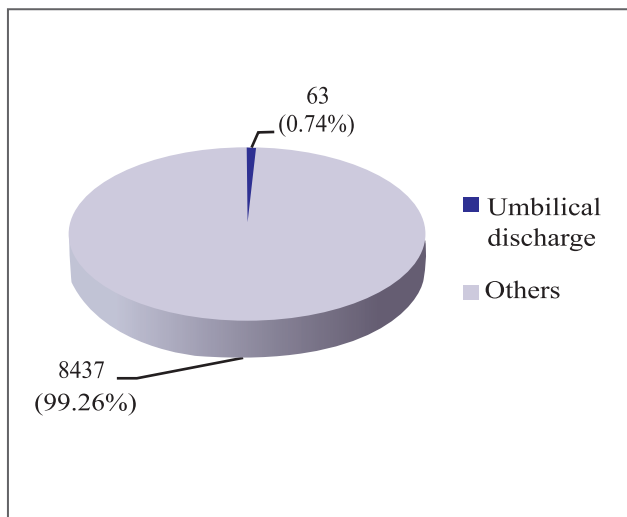
#### MATERIALS AND METHODS

This prospective interventional study was conducted in the Department of Paediatric Surgery, Sylhet MAG Osmani Medical College Hospital, Sylhet during the period of 2 years from January 2013 to December 2014 with a view to find out the causes and management of umbilical discharge in children. All cases of umbilical discharge up to 12 years of age irrespective of sex were included in the study. The guardian of the patient who refused to give consent to enrol in the study and refusal to take proposed treatment were excluded from the study. During the study period a total of 8,500 patients were admitted or attended in the Paediatric Surgery department. Among them 63 patients were diagnosed as umbilical discharge. Among the 63 patients with umbilical discharge 46 patients were enrolled in this study fulfilling the inclusion and exclusion criteria. Patients with umbilical discharge were diagnosed by history, examination and investigations as per data collection sheet. Informed written consent was obtained from the legal guardians of the patients after full explanation of the details of the disease process and purpose of the study. The parents were counseled about the importance of compliance and regular follow up with a standard protocol. Data included age, sex, socioeconomic status, clinical feature, cause, and management, outcome of treatment and relation of timing of separation of umbilical stump with umbilical discharge. These patients who needed surgical intervention were treated accordingly while others were managed conservatively. In case of complications

concerned surgeon or consultant were consulted and appropriate steps were taken. After treatment the patients were followed up with a standard protocol [All patients were evaluated in the outpatient department after 1<sup>st</sup> week, 3<sup>rd</sup> week, 6<sup>th</sup> week and 12<sup>th</sup> week or sooner if problems occurred to see and record the outcome of treatment]. Ethical issues were maintained properly in the study. All the collected data were compiled and analyzed using the SPSS 21 for windows. Quantitative data were analyzed by mean and standard deviation. Qualitative data was analyzed by frequency, percentage and comparison. Chi-square ( $\chi^2$ ) test was done to find out the level of significance. A probability value (p) of <0.05 was considered statistically significant.

**RESULTS**

Incidence of umbilical discharge in paediatric surgery department was 0.74% (Figure-4).



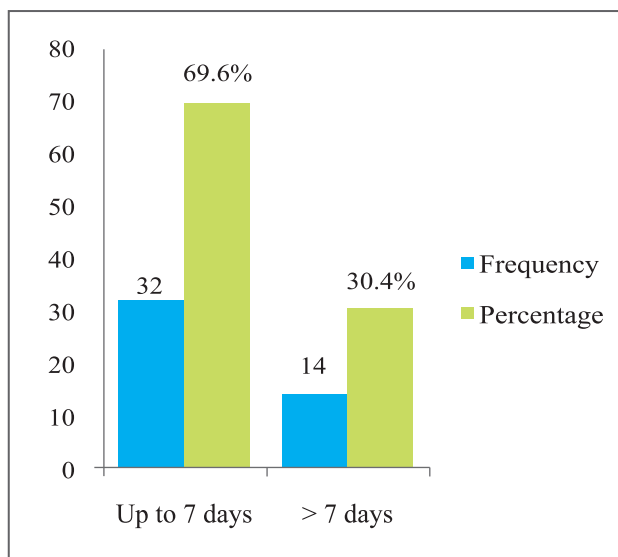
**Figure-4:** Hospital incidence (n=8500).

The age of the patients ranged from 4 days to 11 years with the mean age of 1.46 (SD±2.48) years. Majorities (69.6%) of the patients were below the age of 1 year and 30.4% were older children. Out of 46 patients majority 30 (65.2%) were male and 16 (34.8%) were females with a ratio of 1.9:1. More than two third (67.4%) patients belonged to poor socioeconomic class while 32.6% were from middle class status. Most of the babies (93.5%) were born by normal vaginal delivery (NVD) at home or hospital and only 6.5% were by lower segment caesarean section (LSCS) (Table-I). The day of umbilical cord separation ranged from 3 days to

17 days with the mean age of 6.65 (SD±2.48) days. Majorities (69.6%) of umbilical cord separated within 7 days. Early separation of umbilical cord (3-7 days) was significantly associated with umbilical discharge ( $\chi^2=7.043$ ; p=0.008) (Figure-5). All patients (100%) had umbilical discharge; other presentation were umbilical mass (73.9%), fever (28.3%) and vomiting (17.4%) (Table-II).

**Table-I:** Socio-demographic data (n=46).

Parameters	Frequency	Percentage	
Age	0 to 1 year	32	69.6
	1 to 2 year	4	8.7
	>2 year	10	21.7
	Mean (SD) year	1.46 (SD±2.48)	
Sex	Male	30	65.2
	Femal	16	34.8
Socioeconomic status	Poor	31	65.2
	Middle class	15	34.8
Place and mode of delivery	NVD at home	38	82.6
	NVD at hospital	5	10.9
	LSCS	3	6.5



( $\chi^2=7.043$ ; p=0.008)

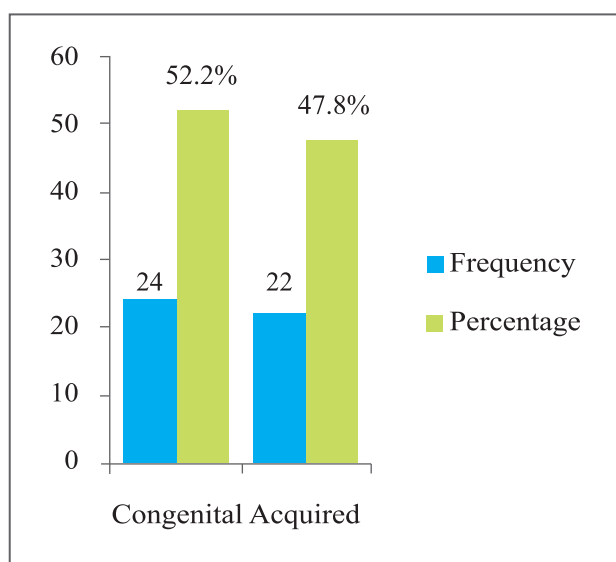
**Figure-5:** Umbilical cord separation time (n=46).

**Table-II:** Clinical presentation other than umbilical discharge (n=46).

Clinical Presentation	Frequency	Percentage
Umbilical mass	34	73.9
Fever	13	28.3
Vomiting	8	17.4

Most of the patient had multiple clinical presentations.

Majority (52.1%) of patients belonged to congenital group and acquired in 22 (47.9%) patients (Figure-6). Among congenital variety 21 (87.5%) were vitellointestinal duct origin, 2 (8.3%) urachal origin and 1 (4.2%) both vitellointestinal duct and urachal origin. Among acquired variety 8 (36.4%) were infectious (Sepsis) and 14 (63.6%) were granuloma.



**Figure-6:** Types of umbilical discharge (n=46)

Regarding causes of umbilical discharge, 19 (41.3%) were due to umbilical adenoma. Other causes were umbilical granuloma 14 (30.4%), umbilical sepsis 8 (17.5%), patent urachus 2 (4.3%), and patent vitellointestinal duct 2 (4.3%) and combined patent urachus and patent vitellointestinal duct 1 (2.2%). But difference between umbilical adenoma and granuloma was not statistically significant ( $\chi^2=0.759$ ;  $p=0.384$ ) (Table-III). Out of 46 patients, 4 (8.7%) had other associated congenital anomalies such as anorectal malformation (ARM), hydrocephalous and malrotation of gut. Treatment options of umbilical discharge were medical in 20 (43.5%) and surgical in 26 (56.5%).

Medical treatment options were chemical cauterization in 14 (30.4%) and dressing in 6 (13.0%) patients; while surgical were laparotomy in 24 (52.1%), wound debridement in 1 (2.2%) and incision and drainage 1 (2.2%) patient (Table-IV). Regarding the outcome, cured in 42 (91.2%) cases; while 3 (6.6 %) patients developed some form of complications who recovered subsequently and 1 (2.2%) died (Table-V). The expired patient was diagnosed as umbilical sepsis with necrotizing fasciitis who was treated with broad spectrum antibiotics and debridement of devitalized tissues. On seventh postoperative day the patient expired.

**Table-III:** Causes of umbilical discharge (n=46).

Causes of Umbilical Discharge	Frequency	Percentage
1. Congenital causes (n=24; 52.1%)		
a. Umbilical adenoma	19	41.3
b. Patent vitellointestinal duct	2	4.3
c. Patent urachus	2	4.3
d. Patent urachus and vitellointestinal duct	1	2.2
2. Acquired causes (n=22; 47.9%)		
a. Umbilical granuloma	14	30.4
b. Umbilical sepsis	8	17.5
Total	46	100

**Table-IV:** Treatment options of umbilical discharge (n=46).

Treatment Options	Frequency	Percentage
Medical treatment (n=20; 43.5%)		
Chemical cauterization	14	30.4
Dressing	6	13
Surgical treatment (n=26; 56.5%)		
Laparotomy (n=24; 52.1%)		
Excision of adenoma	19	41.3
Excision of VID with gut anastomosis	2	4.3
Ligation of urachus at base with excision	2	4.3
Both excision of VID with gut anastomosis and ligation and excision of urachus at base	1	2.2
Wound debridement	1	2.2
Incision and drainage	1	2.2
Total	46	100

**Table-V:** Outcome of umbilical discharge (n=46).

Outcome	Frequency	Percentage
Cured	42	91.2
Complication (3; 6.6%)		
Wound infection	1	2.2
Foreign body granuloma	1	2.2
Wound infection and scar	1	2.2
Death	1	2.2
Total	46	100

## DISCUSSION

Umbilical discharge is not an unusual presentation in infant and children. It is a symptom of varied pathology<sup>12</sup>. However the evaluation and management were rarely discussed. In this study the hospital incidence of umbilical discharge was 0.74%. According to literature, prevalence of umbilical discharge varies in types of disease pathology and geographical location. Among them umbilical granuloma is the commonest cause of umbilical discharge while patent urachus (PU) is the rarest<sup>6,9</sup>. The incidence of omphalitis in developing countries is significantly higher (as high as 4%) than in developed countries (0.7%)<sup>10,13</sup>.

In the present study the age of the patients ranged from 4 days to 11 years with the mean age of 1.46 (SD±2.48) years. Majority of the patients (69.6%) were below the age of 12 months which is consistent with the study of Mshelawala et al. and EL-Bakhy AA<sup>14,15</sup>. Mshelawala et al. found that the age range from 11 days to 9 years<sup>14</sup>. Though umbilical discharge is a disease of infant and children, however Sharma reported adult presentation of umbilical discharge in India with age ranged from 12-60 years<sup>16</sup>. In this study, male female ratio of patients with umbilical discharge was 1.9:1 which was similar as male preponderance of umbilical discharge in the study of EL-Bakhy AA and Sharma V that male to female ratio was 6:1 and 3.9:1 respectively<sup>15,16</sup>. In this study, about 68% of patients with umbilical discharge were from poor socioeconomic group and the rest were from middle class. This might be due to the fact that, usually the poor people seek medical care at government settings whereas the economically solvent people seek care at private settings<sup>17</sup>.

The time of umbilical cord separation might vary depending on ethnic background, geographic location

and method of cord care. Cord separation usually occurred within 1 week after birth and considered delayed if persists beyond 3 weeks<sup>4,8</sup>. In this study about 70% umbilical cords were separated within 7 days. This study also showed that early separation of umbilical cord (within 7 days) was significantly associated with umbilical discharge (p=0.008). This result was different from the study of the others<sup>4,8,18</sup>. This might be due to difference in ethnic background, geographic location, methods of cord care and also recall bias.

In this study in addition to umbilical discharge (100%) about three quarter patients presented with umbilical mass. Other presentations were fever and vomiting. These features were similar with studies of other authors<sup>4,9,18</sup>. The diseases of the umbilical disorder might be congenital or acquired, here in this study congenital variety was found to be more (52.1%) than acquired (47.9%). This result was supported by Mshelawala et al. and Sharma V<sup>14,16</sup>. Mshelawala et al found that 77.8% causes of discharge were due to persistence of embryological remnants and rest were acquired origin while Sharma V found main bulk of patients (58.62%) was congenital in origin.

It was evident from this study, umbilical adenoma (41.3%) was the commonest umbilical abnormality of umbilical discharge followed by umbilical granuloma (30.4%) but difference between these two causes was not statistically significant (p=0.384). This result was dissimilar to the findings of O'Donnell et al. and Palazzi DL and Brandt ML that umbilical granuloma was the commonest umbilical abnormality of umbilical discharge<sup>1,13</sup>. The difference might be due to patients of the umbilical discharge initially attended the paediatrician and most of the patients with umbilical granuloma were responded to medical treatment like this study.

One PVID patient was associated with hydrocephalus which was treated later. The association of hydrocephalus with PVID was not seen previously, although Zafer et al. reported omphalomesenteric duct (OMD) anomalies may be associated with umbilical hernia, intestinal atresia, cardiac malformation, cleft lip, cleft palate, exomphalous, trisomy 13 and Down's syndrome<sup>19</sup>. Fente et al. reported a case of PVID associated with polydactyle<sup>20</sup>. Malrotation of gut with segmental dilatation of ileum was found in a patient of

patent urachus for which resection of segmental bowel loop and anastomosis was done along with ligation and excision of patent urachus. This association was dissimilar with Holten et al. who reported urachal anomaly may be associated with genitourinary anomaly<sup>21</sup>. Two cases of umbilical sepsis were associated with anorectal malformation (ARM) and colostomy stoma was made which may be a contributory factor due to contamination of umbilicus with faecal matter from stoma site. Besides this most of the patients came from poor socioeconomic group who did not have any idea about asepsis and delivered at home where home condition was unhygienic. These findings were supported by Snyder CL, Heuric et al, Gallagher PZ, Daniels J et al<sup>2,8,10,22</sup>.

Modalities of treatment of umbilical discharge depended on the types of disease. Surgery was the main stay of treatment for disease of symptomatic embryonic remnants. But the cases diagnosed as umbilical granuloma not responding to cauterization and umbilical sepsis with complication were also treated surgically. Medical treatment was effective in case of granuloma and omphalitis<sup>4,14,23</sup>. In this study treatment options of umbilical discharge were surgical in 56.5% patients and medical in 43.5% cases. Medical treatment applied in patients with umbilical granuloma and non complicated umbilical sepsis. Medical treatment of umbilical discharge were chemical cauterization by copper sulphate in 14 (30.4%) and aseptic dressing in 6 (13.0%) patients; while surgical treatment were laparotomy in 24 (52.1%), wound debridement in 1 (2.2%) and incision and drainage 1 (2.2%) patient. It was said that the prognosis of umbilical discharge was excellent and complications were rare but omphalitis/umbilical sepsis leading to necrotizing fasciitis was associated with a high mortality of about 80%<sup>8,24</sup>. In this regards the present study revealed that the outcome was excellent (cured and uneventful) in 42 (91.2%) patients; while 3 (6.6%) patients developed some form of complications and one patient died due to septicaemia. Among the 3 patients who developed complications were wound infection 1 (2.2%), foreign body granuloma 1 (2.2%) and wound infection and bad scarring in 1 (2.2%) patient.

## CONCLUSION

In this study umbilical adenoma was more common than umbilical granuloma in children although literature review revealed granuloma is the commonest. This finding may be attributed to the fact that initially the patients with umbilical granuloma visited paediatrician who usually provide chemical cauterization and most of the patients with umbilical granuloma responded to medical treatment as in this study the cure rate was 100% with cauterization by copper sulphate. So it can be assumed that to get the real picture of umbilical discharge baseline study involving multicenter, large sample size may be designed.

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