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THE PREVALENCE AND OUTCOMES OF UMBILICAL PATHOLOGIES IN PEDIATRIC PATIENTS"

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Abstract
Background: Umbilical pathologies in children encompass a spectrum of conditions, including benign lesions, congenital anomalies, and infectious disorders. These conditions vary in clinical presentation and severity, requiring accurate diagnosis and appropriate management to prevent complications and ensure optimal outcomes.
Objective: To determine the frequency and short-term treatment outcomes of umbilical pathologies in pediatric patients presenting to a tertiary care hospital.
Methods: Umbilical pathologies in pediatric patients include benign conditions, congenital anomalies, and infectious processes that commonly present in surgical practice.To prevent the development of complications and to maximize the prognostic results, it is necessary to implement timely diagnostic guidelines and reasonable methods of therapeutic intervention..
Results: total of 106 pediatric patients were included in the study, with a male predominance (58.5%). Umbilical granuloma was the most common pathology (39.6%), followed by umbilical polyp (17.9%) and umbilical hernia (14.2%). Other conditions included patent omphalomesenteric duct with Meckel's diverticulum (10.4%), omphalitis with abscess (8.5%), umbilical sinus (5.7%), and patent urachus (3.8%). Management varied according to the underlying condition, including both conservative and surgical approaches. At 30-day follow-up, favorable outcomes were observed in 84.9% of patients, while 15.1% had unfavorable outcomes.
Conclusion: The umbilical pathologies are common in the pediatric population, mostly benign, and have positive short-term results when properly handled. Clinical assessment and early therapy treatment is necessary to maximize treatment results and reduce the number of complications.

KEYWORDS: Umbilical pathologies, Umbilical granuloma, Umbilical hernia, Omphalitis, Omphalomesenteric duct, Patent urachus, Pediatric surgery, Treatment outcomes, Congenital anomalies, Tertiary care hospital

INTRODUCTION

Umbilical pathologies present a major percentage in congenital and acquired cases of surgery in children. These are benign disorders like umbilical granuloma, congenital anomalies like remains of the omphalomesenteric duct and urachus, and serious infections possibly like omphalitis. Such conditions are a significant burden on the workload of the pediatric surgical services, especially in the low- and middle-income countries where late presentation and access to neonatal care continue to be widespread. According to the epidemiological evidence, the prevalence of umbilical hernia is around 10-30% in children worldwide and it is more prevalent among the infants who are born either with preterm birth or with low birth weight of babies {1}. The other frequent complication after the separation of the umbilical cords is umbilical granuloma, which occurs in about 3-10% of newborns, and it usually needs topical therapy or cauterization {2}. A small percentage of gastrointestinal malformations is related to congenital anomalies such as remnants of omphalomesenteric ducts, and the urachal anomalies are estimated to have a prevalence of about 1 in 5,000 of live births {3}. The infectious disease, especially omphalitis, has been of clinical significance to this day, despite the improved management of the newborn neonates. Incidence reported is between 0.5 and 8 per 1,000 live births across the world with more morbidity in the developing world {4}. Failure to diagnose early and treat may result in complications like sepsis and infection of the soft tissue, and thus early diagnosis and treatment are vital {5}. Even though most umbilical pathologies are harmless and self-limiting, there are a few causes that necessitate surgical treatment and may be reproductive, infectious or morbid. The recent research emphasizes that early diagnosis, standardization of assessment, and proper management plans can enhance clinical outcomes, and that is why attention is paid to them as well as early diagnosis {1,5}. Nonetheless, there is little region-specific data on the spectrum, frequency, and short-term outcomes of umbilical pathologies of pediatric populations in tertiary care environment, especially in South Asia. Thus, the research was carried out to identify the frequency and short-term therapy of

umbilical pathologies in children who have presented themselves to the tertiary care hospital with the intention of improving the evidence-based clinical practice and enhancing patient outcomes.

METHODOLOGY

It was a longitudinal descriptive study, which was performed at the Department of Pediatric Surgery, National Institute of Child Health (NICH), Karachi, Pakistan in the duration from 18 December, 2025 to 31 April, 2026 The research was conducted within a span of 6 months, and a 30-day post-intervention follow-up was to be conducted to establish the achievements of the treatment. The patients covered by the study were those children aged 0-14 years presenting to the outpatient section, emergency unit, or inpatient wards with clinically or radiographically defined umbilical pathologies.

The sample size for this descriptive study was calculated using the standard formula $n = \frac{Z^2 \times P(1-P)}{d^2}$. A confidence level of 90% was selected (Z = 1.64). The expected prevalence of umbilical pathologies was assumed to be 11% based on the study by Sharma HV et al., and the margin of error was set at 5%. The calculated sample size was 105.5, which was rounded up to a final sample size of 106 patients.

Inclusion criteria included patients of both genders aged 0-14 years with known umbilical pathologies as their guardians gave informed consent. The exclusion criteria were lack of consent and lost to follow-up, presence of umbilical conditions due to systemic or syndromic diseases and pre-existing history of surgical intervention of the same condition elsewhere. The data were collected by seeking the ethical approval of the Institutional Review Board of the National Institute of Child Health and College of Physicians and Surgeons Pakistan. Parents or guardians were given informed consent in written form before entering the study. The principal investigator or supervising consultant assessed each patient. These were diagnosed by clinical examination with the help of ultrasound or other appropriate investigations where needed and confirmed intraoperative in surgical cases. The information was documented on a structured proforma, which had demographic information (age, sex, weight), clinical presentation, time of symptoms, type of umbilical pathology, investigations, management modality (conservative or surgical), intraoperative findings (where available), and treatment outcomes. The patients were dealt with as per the normal institutional practices and the 30 days follow up through outpatient consultation or by looking at the medical record. The confidences were upheld by giving every respondent a distinct identification number. Its main outcome was treatment outcome, which had the categories of favorable (complete recovery without complications) and unfavorable (infection, persistent discharge, wound complication, or need of re-intervention within 30 days). The SPSS 26 was used to analyze data. The ShapiroWilk test was used to test the normality of continuous variables. Variables that were normally distributed were shown in the form of mean as Standard deviation and non-normally distributed variables were represented in the form of median and the interquartile range. Frequencies and percentages were used to summarize the categorical variables. The associations between categorical variables were assessed with the chi-square test, or Fisher's exact test. The p-value of 0.05 and below was regarded as significant.

RESULTS

A total of 106 pediatric patients with umbilical pathologies were included in the study. Among them, 62 (58.5%) were male and 44 (41.5%) were female.

The spectrum of umbilical pathologies observed in the study population is summarized in Table 2. Umbilical granuloma was the most common condition, identified in 42 patients (39.6%). Umbilical polyp was observed in 19 cases (17.9%), followed by umbilical hernia in 15 patients (14.2%). Patent omphalomesenteric duct associated with Meckel's diverticulum and polyp was identified in 11 patients (10.4%). Omphalitis with abscess formation was reported in 9 cases (8.5%), while umbilical sinus and patent urachus were found in 6 (5.7%) and 4 (3.8%) patients, respectively.

The distribution of different umbilical pathologies is illustrated in Figure 1, while their proportional representation is shown in Figure 2.

Management strategies varied according to the underlying pathology and clinical presentation. Umbilical granuloma cases were primarily managed with topical silver nitrate cauterization. Umbilical hernia was managed either conservatively or surgically depending on clinical indication, with selected patients undergoing hernia repair. Infectious conditions such as omphalitis were treated with antibiotics, and abscesses required incision and drainage. Congenital anomalies, including patent urachus and omphalomesenteric duct remnants, were managed surgically.

At 30-day follow-up, 90 patients (84.9%) showed favorable outcomes, while 16 patients (15.1%) had unfavorable outcomes. Favorable outcomes were defined as complete resolution of symptoms without complications. Unfavorable outcomes included persistent discharge, infection, wound complications, or the need for re-intervention.

Detailed demographic characteristics, spectrum of pathologies, and treatment outcomes are presented in Tables 1–3.

Table 1: Demographic Characteristics

Variable	Frequency (n)	Percentage (%)

Male	**62**	**58.5**
Female	**44**	**41.5**

Table 2: Spectrum of Umbilical Pathologies

Variable	Frequency (n)	Percentage (%)
Umbilical Granuloma	**42**	**39.6**
Umbilical Polyp	**19**	**17.9**
Umbilical Hernia	**15**	**14.2**
POMD + Meckel's with Polyp	**11**	**10.4**
Omphalitis + Abscess	**9**	**8.5**
Umbilical Sinus	**6**	**5.7**
Patent Urachus	**4**	**3.8**

Table 3: Treatment Outcomes at 30 Days

Outcome	Frequency (n)	Percentage (%)
Favorable Outcome	**90**	**84.9**
Unfavorable Outcome	**16**	**15.1**

Figure 1: Frequency distribution of different umbilical pathologies among pediatric patients presenting to a tertiary care hospital (n = 106).

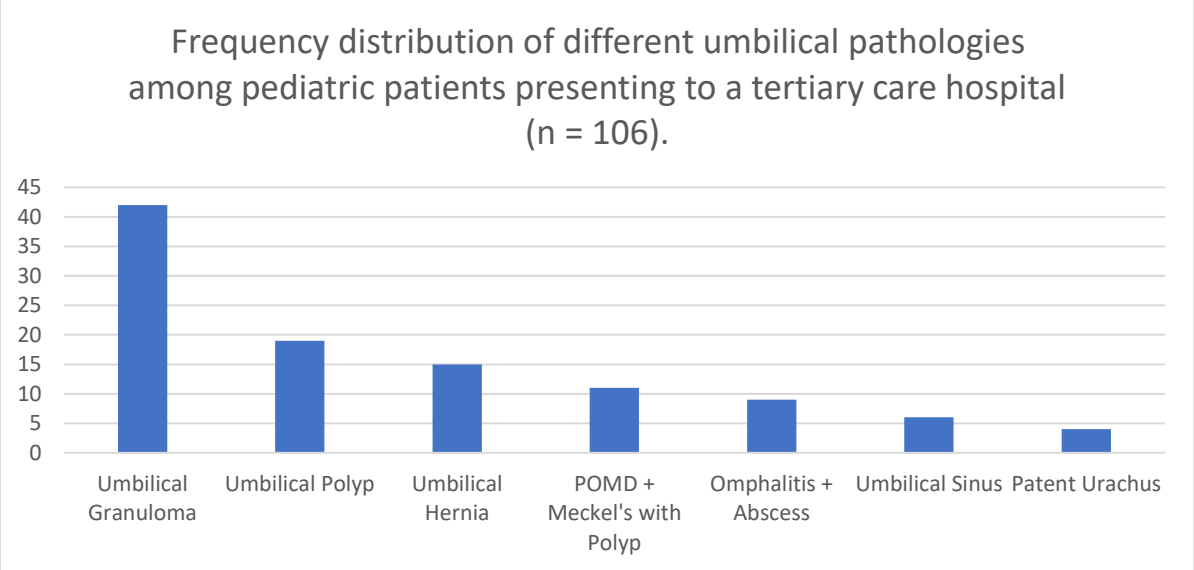
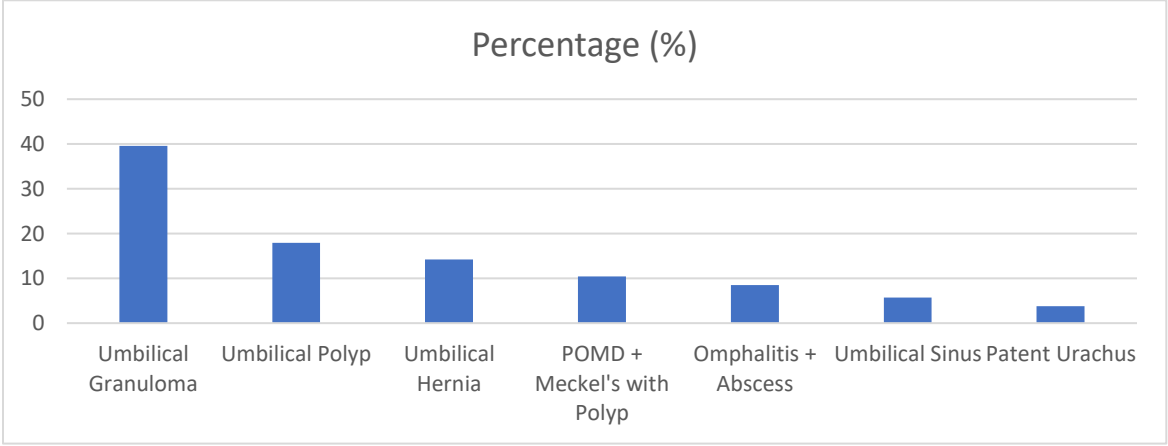


Figure 2: Percentage distribution of various umbilical pathologies in the study population, illustrating their relative proportions within the total sample (n = 106).



DISCUSSION

The current research determined the spectrum and short-term outcomes of treatment of umbilical diseases among children who attended a tertiary care unit. The results reveal that benign pathologies, especially umbilical granuloma and umbilical hernia are dominant and relatively less common are congenital anomalies and infectious conditions. The trend is in agreement with the peer literature of pediatric surgical practice where these conditions are identified to be the most prevalent umbilical disorders in infancy and early childhood {6,7}. In this study, umbilical granuloma was found to be the commonest pathology. This observation is in line with other past studies that have indicated that it is a common instance after the separation of the umbilical cord. It is normally regarded as a non-invasive disease and can be treated with ease through conservative management. Umbilical granuloma is caused by the lack of complete epithelialization of the umbilical stump which results in the remaining granulation tissue. Silver nitrate or common salt has been found to be highly successful in topical therapies, and has been in line with the positive results that we have reported in our study {6,8}. Another common condition that was noted was Umbilical hernia. It develops because of the partial obliteration of the umbilical ring and is more common among infants especially those born with low birth weight or preterm. Majority of the cases healed on their own, but in some patients with large defects or persistent hernia, surgery could be necessary. The results of this research fit into the already existing data that demonstrates its frequent occurrence and usually positive prognosis {9}. Infectious diseases, especially omphalitis were not as common but clinically important with its risk of complication. Omphalitis is the infection of bacterial umbilical stump and the surrounding tissues which can lead to systemic infection once not treated in time. To prevent unfavorable outcomes, it is necessary to detect the disease at an early stage and implement treatment with the necessary antibiotics. The fact that the frequency of this condition is relatively low in this study could be due to the fact that neonatal care practices are now better developed but the condition still remains a clinical issue in resource-limited environments {10}. Less frequently, congenital defects like patent omphalomesenteric duct and residues of the urethra were found. These disorders are the results of failure of obliteration of embryological structures and can be manifested by the continued discharge or infection among other complications. To ensure effective treatment and avoid relapses, surgical treatment is normally needed. The results of this paper are consistent with the literature that has been published earlier highlighting the need to provide timely surgical intervention in such situations {11,12}. The success of timely diagnosis and proper management plans was seen in the overall treatment outcomes of most patients in this study. Conservative interventions would prove effective in treating the majority of benign diseases, whereas surgical intervention would offer conclusive treatment to congenital anomalies and selected instances of hernia. These findings indicate the significance of personalized treatment according to the pathophysiology. There are several strengths of this study. It serves as a recent institution-based data on the clinical spectrum and short-term outcomes of umbilical pathologies in a pediatric population. The reliability of the findings is increased because the standardized diagnostic criteria were used, and a structured follow-up period was used. Nevertheless, some restrictions must be applied. The researchers used one tertiary care center, and thus the research could be limited to that center. The limited follow-up time was a limitation to the evaluation of the long-term outcomes like recurrence. Also, non-probability sampling can bring about selection bias.

CONCLUSION

Umbilical pathologies are among the most frequent presentations in pediatric surgical practice and most common pathologies are not pathological such as umbilical granuloma, umbilical hernia. Although less common, congenital anomalies and infectious conditions need to be recognized and managed appropriately to avert complications. This study shows that early diagnosis and follow-up treatment leads to good short-term results in most patients. A structured clinical approach as well as timely intervention is key to optimal care. Further multicenter studies with longer follow-up are recommended to assess long-term outcomes and optimize evidence-based management recommendations for pediatric umbilical pathologies in various healthcare settings.

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