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Evaluation of Silver-Impregnated Hydro-fiber Dressing in the Non-Operative Management of Omphalocele

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Abstract **Original Research Article**

Background: In the arena of pediatric surgery, omphalocele is one of the most common abdominal wall defects. In the non-operative management of omphalocele, silver-impregnated hydro-fiber dressing is widely used. But in Bangladesh, we do have not enough research-based data regarding the effectiveness and outcomes of this procedure in the non-operative management of omphalocele. ***Aim of the study:*** This study aimed to evaluate the effectiveness and outcomes of silver-impregnated hydro-fiber dressing in the non-operative management of omphalocele. ***Methods:*** This was a prospective interventional study and was conducted in the Department of Pediatric Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh from March 2018 to June 2020. In total 10 neonates with omphalocele using silver-impregnated hydro-fiber dressing were enrolled in this study as the study subjects. The random sampling (Lotter) method was applied in the sample selection procedure. Data were collected in a pre-designed data collection sheet. Data were processed, analyzed and disseminated by using the MS Office program. ***Results:*** In this study, the male-female ratio of the participants was 1:2.3. The mean ±SD age of the respondents was 1.0 ±0.66 years. In the majority of the neonates (90%), the size of the omphalocele sac was >5 cm and the time to start epithelization was 15.10 ±2.23 days. At the first admission, hospital stay was for 5.10 ±1.19 days in total neonates and the time to start epithelization of the neonates was 15.10 ±2.23 days. In our study, we observed that the time to complete epithelization was 63.60 ±14.60 days. ***Conclusion:*** Silver-impregnated hydro-fiber dressing is an effective treatment procedure in the non-operative management of omphalocele.

Keywords: Omphalocele, Silver impregnated hydro-fiber dressing, Escharification, Epethelization.

1. INTRODUCTION

In pediatric surgery, omphalocele is the most frequently encountered congenital abdominal wall defect [1]. The prevalence of omphalocele is 0.9 to 3.8 per 10,000 live births in India; specifically, most omphalocele cases may have other anomalies including cardiac, urologic, gastrointestinal, neurologic and musculoskeletal conditions [2]. Specifically, omphalocele is associated with Beckwith-Wiedemann syndrome, Exstrophy, OEIS complex and pentalogy of Cantrell [3-5]. Omphaloceles are categorized as small or giant defects and various anatomic classifications determine the prognosis. The most used classification is Aitken classification and type I: larger of defects <4 cm, sac diameter <8 cm and absence of liver as well as type II: collar base >5 cm, sac diameter >8 and presence of the liver in the sac [6]. Non-surgical management of omphalocele with principal epithelialization is considered to be an effective option, although it has a higher occurrence of sepsis and needs proper correction of the ventral hernia later in life. This was reported that non-operative delayed treatment procedure was associated with lower mortality compared to the early stepped surgical correction and a quicker start to complete enteral feeding during the neonatal period [7]. In the management of omphalocele, prolonged sloughing can result in the formation of hardened eschar formation. Silver-impregnated hydro-fiber supports autolytic debridement of slough promoting a healthy wound bed as well as eventual new tissue formation [8]. Silver-impregnated hydro-fiber dressing has some side effects like cytotoxicity, staining, methemoglobinemia and electrolyte disturbance and/or longer slough separation time [9]. Silver-impregnated hydro-fiber formulae are a gel on contact with wound fluid that incorporation of ionic silver into the hydro-fibers. But in vitro and vivo

studies have shown lower systemic silver ion concentrations. Silver-impregnated hydro-fiber dressing decrease hospital stay, epithelization time, and escherification time more than silver sulfadiazine dressing [8] The objective of this current study was to evaluate the effectiveness and outcomes of silver-impregnated hydro-fiber dressing in the non-operative-management-of omphalocele.

2. METHODOLOGY

This was a prospective, interventional study that was conducted in the Department of Pediatric Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh from March 2018 to June 2020. The study was approved by the ethical committee of the mentioned hospital. Properly written consent was taken from all the participants before data collection. The whole intervention was conducted following the principles of human research specified in the Helsinki Declaration [10] and executed in compliance with currently applicable regulations and the provisions of the General Data Protection Regulation (GDPR) [11]. Obeying the inclusion criteria of this study, in total 10 neonates with omphalocele using silver-impregnated hydro-fiber dressing were enrolled in this study as the study subjects. The random sampling (Lotter) method was applied in the sample selection procedure. On the other hand, according to the exclusion criteria of this study, neonates with ruptured omphalocele sacs and omphalocele with unstable patients were excluded. All the demographic and clinical information of the participants was recorded. Data were collected in a pre-designed data collection sheet. Data were processed, analyzed and disseminated by using the MS Office program.

3. RESULT

In this study, among the total participants, 30% were male whereas the rest 70% were female. So, the male-female ratio of the participants was 1:2.3. The mean ±SD age of the respondents was 1.0 ±0.66 years and 20% of children were from 0 days, 60% were from 1 day and 20% were from 2 day's age groups. In analyzing the birth history, we observed that 90% of our participants took antenatal care, in 90% of cases full term was performed; the mean birth weight was 2.51±0.88. In the majority of the neonates (90%), the size of the omphalocele sac was >5 cm. In our current study, the time to start epithelization was 15.10 ±2.23 days. In analyzing the hospital staying period of the participants at the first admission, we found that at first admission hospital stay was for 5.10 ±1.19 days in total neonates. In this study, the time to start epithelization of the neonates was 15.10 ±2.23 days. We observed that the time to complete epithelization was 63.60 ±14.60 days.

Table 1: Distribution of participants as per age, (N=10)

Age (Day)	n	%
0	2	20%
1	6	60%
2	2	20%
Mean± SD	1.0±0.66	

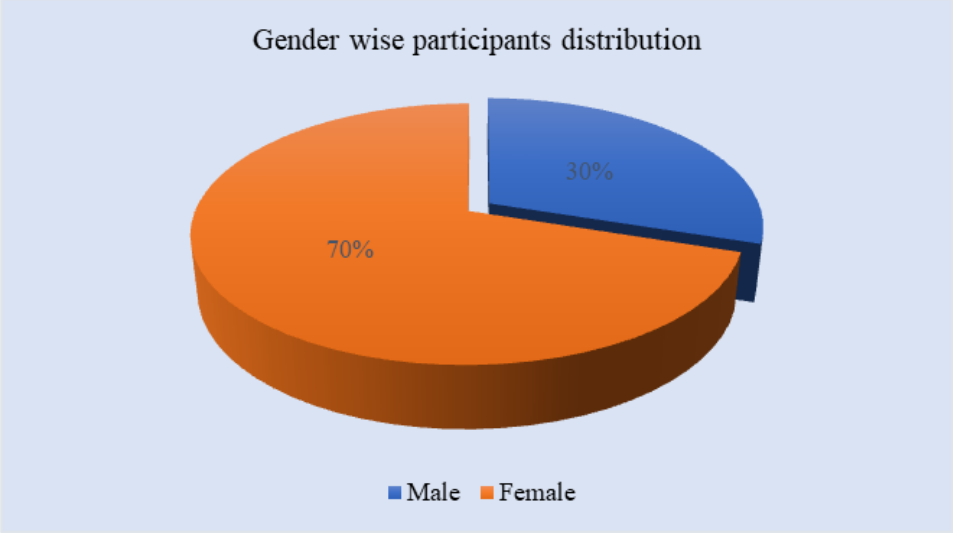

Figure 1: Distribution of participants as per gender, (N=10)

Table 2: Distribution of participants as per birth history, (N=10)

Characteristics	n	%
Antenatal care		
None	1	10%
Visit	9	90%
Delivery		

Characteristics	n	%
Premature	1	10%
Full term	9	90%
Birth weight		
≤2.5 kg	5	50%
>2.5 kg	5	50%
Mean ±SD	2.51±0.88	

Table 3: Distribution of participants as per omphalocele sac size, (N=10)

Omphalocele (sac) size	n	%
≤5 cm	1	10%
>5 cm	9	90%
Mean ±SD	9.20±3.01	

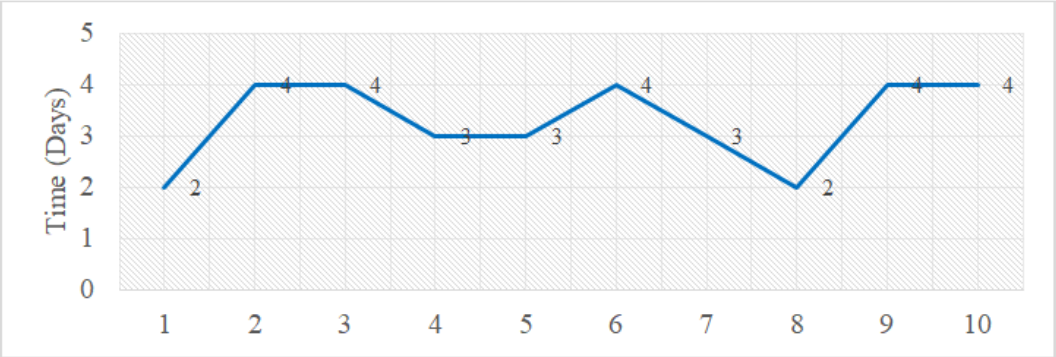

Figure II: Time to escharification of neonates, (N=10)

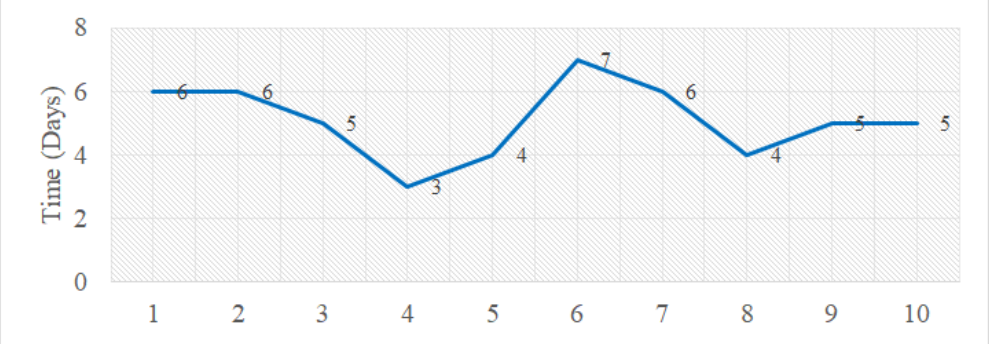

Figure III: Duration of hospital stay at first admission, (N=10)

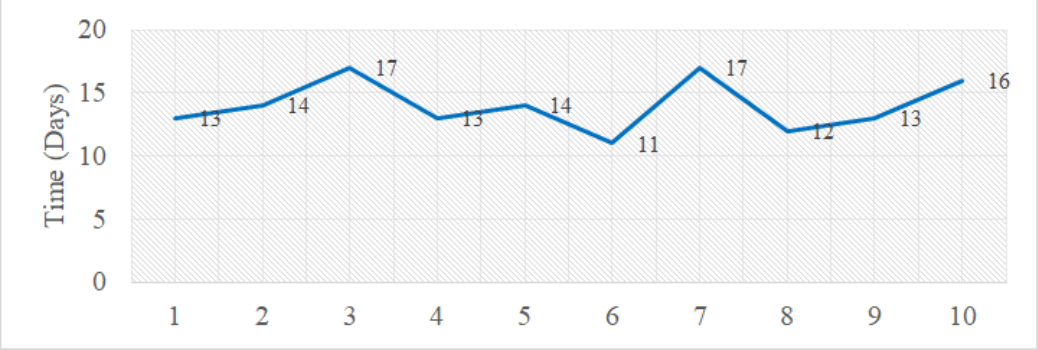

Figure IV: Time to start epithelization of neonates, (N=10)

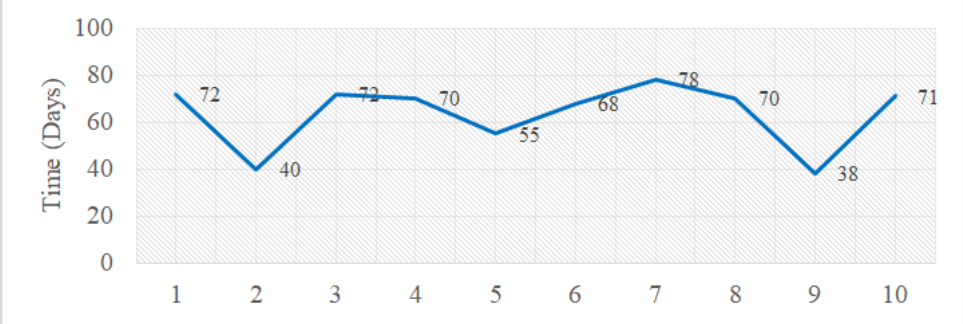

Figure V: Completed time to epithelization of neonates, (N=10)

4. DISCUSSION

This study aimed to evaluate the effectiveness and outcomes of silver-impregnated hydro-fiber dressing in the non-operative management of omphalocele. In this current study, 20% were male and 80% were female in group A. These findings were similar to the findings of another research [12]. In some other studies by Mac-Bird *et al*., [13] and Rattan *et al*., [2] they reported that omphaloceles occur more frequently in males than in females. The birth weight of our participants was 2.51±0.88 Kg. This finding was well in agreement with the findings of the others [14] they found an average birth weight of 2.84 kg. In this study, in the majority of the neonates, the omphalocele size (sac) was >5 cm which was in 90% of cases. The average diameter omphalocele (sac) size was 9.20±3.01 cm. So, the findings of the study were well in agreement with the findings of the other study [12] they found omphalocele as a defect larger than 10 cm in diameter. A narrow neck of the sac (<5 cm) was in 3 babies. Depending on the size of the defect (< or >5 cm) and the content of the sac (part or whole liver), it may be classified as omphalocele minor or major, respectively [15]. In our study, the time to scarification was 3.3 ±0.82 days. These findings of the study were in good agreement with the findings of the other research works [8, 14]. They also found the time to escharification was 3.1±0.79 days in silver-impregnated hydro-fiber dressing. Another study [14] found the time to escharification was 3.21±0.83 days in silver-impregnated hydro-fiber dressing. Previous study [4] reported a shorter time to escharifiation in silver-impregnated hydro-fiber dressing than silver sulfadiazine dressing group. Another study in the USA [16] reported escharification time was 2.9±0.9 days in silver-impregnated hydro-fiber dressing. In this study, hospital stay was 5.10±1.19 days in silver-impregnated hydro-fiber dressing. A similar study [8] found time to hospital stay was 5.45±1.32 days in silver-impregnated hydro-fiber dressing. Another similar type of study [12] found time to hospital stay was 5.34±1.26 days in silver-impregnated hydro-fiber dressing. Another study in the United States of America (USA) [16] reported time to hospital stay was 5.9±1.90 days in silver-impregnated hydro-fiber dressing. In this study, it was observed that the time to start epithelialization was 15.10±2.23 days. This finding is consistent with other research works [8, 14]. Marical *et al*., (2015) [17] found time to start epithelialization was 15.45±3.29 days in silver-impregnated hydro-fiber dressing. In our study, the time to complete epithelialization was 63.60±14.60 days. This finding is consistent with other studies [8, 14]. All the findings of this current study may be helpful in further similar studies.

Limitation of the study:

This was a single-centered study with small-sized samples. Moreover, the study was conducted over a very short period. So, the findings of this study may not reflect the exact scenario of the whole country.

5. CONCLUSION & RECOMMENDATION

As per the findings of this current study, we can conclude that silver-impregnated hydro-fiber dressing is an effective treatment procedure in the non-operative management of omphalocele. For getting more specific results, we would like to recommend conducting similar studies in several places with larger-sized samples.

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