

Original Article

Major Omphalocele: Experience with Topical Honey Treatment in A Tertiary Health Centre in North Central Nigeria.

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ABSTRACT

Background: Major omphalocele are a source of neonatal morbidity and mortality. Primary surgical closure is the ideal management in developed nations with advanced neonatal care but flooded with dismal results in poorly equipped centers. Conservative care by the use of escharotic agents is ideal for this center. Topical wound care with honey has demonstrated safety and shown impressive outcome. The aim is to show our experience in the care of major omphalocele with topical use of honey as escharotic agent. **Material And Methods:** This was a 10-year retrospective study of neonates admitted into the Special Baby Care Unit of Jos University Teaching Hospital clinically diagnosed with unruptured major omphalocele from January 2008 to June 2018. The wound was dressed daily with gauze soaked in 10-20 mls of honey. The wound was observed for the presence of infection, rupture of sac, the mean durations of complete separation of the eschar and complete epithelialization (healing). The age at presentation, sex and weight were assessed. **Results:** A total of 36 neonates were treated. There were 17 (47.2%) males and 19 (52.8%) females (M: F=1:1.1) with a mean age of presentation of 54.28 hours (S.D 67.007). The mean weight was 3.025Kg (S.D 0.4150). Risk of sepsis was present in 9 (25%) and associated sepsis was present in 14 (38.9%). Associated congenital malformations were detected in 11 (30.6%). Eleven (30.6) developed complications with sepsis accounting for 81.8% of the total complications. Ten (27.8%) died before assessing for eschar separation. Sepsis and prematurity accounted for majority of the cause of death. The mean duration of eschar formation was 31.9 days (D.S 10.566). The mean duration of complete epithelialization (healing) was 12.19 weeks (S. D 1.059). Gender, age at presentation, risk of sepsis, associated sepsis at presentation and associated congenital malformation did not have significant association with either eschar separation or complete epithelialization. One patient had rupture of the omphalocele sac. **Conclusion:** Honey is safe and effective escharotic agent in the conservative management of major omphalocele. The procedure is easy, simple, practical, less expensive, not requiring equipment and can be used in limited resource centers

Keywords: Major Omphalocele, Honey, Topical, Eschar Separation, Complete Epithelialization

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INTRODUCTION

Major omphaloceles are a source of neonatal morbidity and mortality¹. Primary surgical closure is the ideal management option. The risk of abdominal compartment syndrome that results from the associated viscerio-abdominal disproportion is the major challenge of this management option. Outstanding excellent outcome results have been demonstrated in studies from specialized centers with advanced neonatal care.

However, this is often flooded with dismal results in poorly equipped centers. The conservative management, otherwise called the escharotic therapy, was first described in 1899 by Ahlfeld and further popularized by Grob. This has become the ideal option for these centers. The procedure is easy, less expensive and does not require any special equipment. It is effected by the topical application of different escharotic agents to the omphalocele wound resulting into a ventral hernia that is subsequently repaired months later.

This has been a well-established practice in many African countries including Nigeria^{23,4}. The aim of this management option is to convert the flimsy, non-living, protein-rich membrane into a tough and waterproof eschar. Granulation tissues proliferate and eventually epithelize underneath the eschar. The healing results in the formation of a ventral hernia that is subsequently repaired months later. Different topical escharotic agents have been used. Wound sepsis and systemic toxicities amongst other complications have been reported^{5,2,6,3}. Generally, topical wound care with Honey has shown remarkable outcomes^{7,8,9,10}.

Honey is natural, cheap and available even in remote local communities. Scientifically beneficial mechanisms to substantiate its superiority over other topical agents have been enumerated in some studies. Honey has a high osmolality and a superior adsorbent dressing effect that promotes a moisture balanced wound environment. This results in the formation of a clean healthy granulation tissue with good epithelialization. Honey locally stimulates the immune system but reduces the local inflammatory response, exudation, oedema and pain. This minimizes and or prevent hypertrophic scar formation. Honey also has an antioxidant effect and a direct broad-spectrum antibacterial activity. It clears infection in infected wounds thereby reducing wound bioburden. This also reduces the wound malodour^{11,9,12,10,13,7,8,14}.

Previous studies on the experience of wound care with the topical use of Honey as an escharotic agent for the management of major omphaloceles have demonstrated safety and impressive outcome³. The aim of this study is to show our experience in the care of major omphaloceles with the topical use of Honey as an escharotic agent.

MATERIAL AND METHODS

This was a 10-year retrospective case study of 36 neonates and admitted into the Special Baby Care Unit of our facility clinically diagnosed with unruptured major omphalocele from January 2008 to June 2018. The inclusion criteria for this study were all neonates and infants clinically diagnosed with unruptured major omphalocele. The exclusion criteria included minor omphalocele, ruptured omphalocele, gastroschisis, and bladder exstrophy. The treatment consisted of daily occlusive dressing with gauze soaked in 10-20mls of honey applied on the entire omphalocele wound after cleaning with normal saline. The dressing is stabilized with gauze bandage. The patients were discharged home after complete separation of the eschar. The process was continued on out-patient bases until complete epithelialization (healing) was achieved. All the patients had parenteral antibiotic prophylaxis with ceftriaxone 50mg/Kg in two divided doses and metronidazole 7.5 mg/Kg thrice daily for a week and subsequently converted to oral forms for another week.

The cases were retrospectively studied after ethical clearance had been obtained from the Health

Research Ethics Committee. Data were extracted from case notes and discharge summaries. Statistical analysis was performed using the Statistical Packaged for Social Science (IBM SPSS statistic version 24). Fischer exact test (with 95% confidence limits where appropriate) and student t-test were used for comparison of categorical and continuous variables respectively. Statistical significance was set at $p < 0.05$.

RESULT

A total of 36 neonates were treated for major omphalocele with intact membrane within this study period based on the criteria described in the methodology. There were 17(47.2%) males and 19(52.8%) females (M:F=1:1.1) aged between 1 and 216 hours with a mean age of 54.28hours(S.D 67.007)(Table 1)

Table 1: Age and Gender Distribution

Age (Hours)	Gender		Total
	M	F	
≤72	13	13	26(72.2%)
>72	4	6	10(27.8%)
Total	17(47.2%)	19(52.8%)	36(100%)

Mean=54.28 hours (S.D 67.007), Range=1-216 hours

The weights range between 2.0 to 3.5 Kg with a mean age 3.025Kg (S.D 0.4150) as demonstrated in Table 2.

Table 2: Weight and Gender distribution

Weight (Kg)	Gender		Total
	Male	Female	
≥2.5Kg	15	16	31(86.1%)
<2.5Kg	2	3	5(13.9%)
Total	17(47.2%)	19(52.8%)	36(100%)

Mean=3.025Kg (SD 0.4150) Range=2.0-3.5 Kg

Thirty-two (88.9%) patients were delivered at term while the remaining 4(11.1%) were preterm as demonstrated in Table 3.

Table 3: Gestational age and Gender distribution

Gestational age	Gender		Total
	Male	Female	
Preterm	2	2	4(11.1%)
Term	15	17	32(88.9%)
Total	17(47.2%)	19(52.8%)	36(100.0%)

Risk of sepsis was present in 9 (25%) of the neonates. Associated sepsis at presentation was seen in

14(38.9%) of the neonates. Associated varying congenital anomalies were seen in 11(30.6%) of the neonates

The age at commencement of Horney dressing ranges between 24 hours to 240 hours after birth with a mean of 69.23 hours (S.D 69.997) as shown in table 2

Table 4: Postnatal Age at commencement of Horney Dressing and Gender Distribution

Age Commencement (Hours)	Gender		Total
	Male	Female	
≤72	13	15	28(77.8%)
>72	4	4	8(22.2%)
Total	17(47.2%)	19(52.8%)	36(100.0%)

Mean=69.23hours (SD 69.997) Range=24-240 hours

Eleven (30.6%) developed complications as follows: Sepsis-9(81.8%), Hypoglycaemia-1(9.1%), and sac rupture-1(9.1%). Ten (27.8%) patients died before assessing for eschar separation and healing. The causes of death were as follows: Sepsis-8(72.7%), hypoglycaemia-1(9.1%), prematurity-2(18.2%). The remaining 26 patients had further assessment.

The days of Eschar separation following Commencement of Horney dressing in the remaining 26 patients ranges between 17 to 58 days with the mean of 31.96 days (S.D 10.566) as shown in Table 5.

Table 5: Days of Eschar separation after commencement of Horney Dressing and Gender distribution

Days of Eschar Separation(days)	Gender		Total
	Male	Female	
≤30	7	7	14(53.8%)
>30	6	6	12(46.2%)
Total	13(50.0%)	13(50.0%)	26(100.0%)

Mean=31.96days (SD 10.566) Range=17-58 days

Complete epithelialization that signifies healing ranges between 9 to 14 weeks with a mean of 12.19 weeks (S.D 1.059) as shown in Table 4

Table 6: Complete epithelialization (Healing) and Gender distribution

Complete Epithelialization(weeks)	Gender		Total
	Male	Female	

≤12	8	10	18(69.2%)
>12	5	3	8(30.8%)
	13(50.0%)	13(50.0%)	26(100.0%)

Mean=12.19 weeks (S.D 1.059) Range=9-14 weeks

Table 7 shows factors that determine early/late eschar separation

	Eschar separation		P-value
	≤30	>30	
Gender			
M	7	6	1.000
F	7	6	
Age at presentation			
≤72	10	7	0.780
>72	3	5	
Risk of sepsis			
Yes	1	1	0.910
No	13	11	
Associated sepsis			
Yes	7	3	0.177
No	7	9	
Associated anomalies			
Yes	1	2	0.372
No	13	10	

Table 7 shows factors that determine early/late complete epithelialization (Healing)

	Complete Epithelialization		P-value
	≤12 weeks	>12 weeks	
Gender			
M	8	5	0.118
F	10	3	
Age at presentation			
≤72 hours	11	6	0.157
>72 hours	7	2	
Risk of sepsis			
Yes	1	1	0.539
No	17	7	
Associated sepsis			
Yes	6	4	0.178
No	12	4	
Associated anomalies			
Yes	2	1	0.855
No	16	7	



Figure 1: Omphalocele wound in the process of eschar separation



Figure 2: Complete epithelialization(healing)

DISCUSSION

Primary surgical closure is the ideal management of major omphaloceles especially in specialized centers with advanced neonatal care. However, the option of conservative management effected by the topical application of escharotic agents and subsequently repair of the result ventral hernia at a later day is the best option for poorly equipped centers with limited advanced neonatal care. Horney has demonstrated safety and impressive outcome in general and omphalocele wounds. In addition to the numerous wound advantages, honey is a natural, cheap and the most available amongst the numerous escharotic agents.

The slight female dominance (M: F =1:1.1) observed in this study is similar to findings from the study by Abdur-Rahman et al and Louise et al^{15,16}. Other studies in Egypt and Babylon have shown equal gender distribution^{17,18}. The study by Bode et al in Lagos Nigeria and Eltayeb et al in Egypt showed a contrasting male dominance^{2,3}. Adequate nutrition, optimal hydration, normothermia and clean sterile dressing is essential for better neonatal outcome in the escharotic care. This can most likely be obtained when the patient presented immediately to the appropriate health facility. The mean age of presentation of 54.28

hours observed in our study contrasts with lower findings ranging from 27.5 hours and 48 hours observed studies in Ilorin, Kano and Lagos Nigeria^{3,16,19,20}.

The majority (72.2%) of the patient in our study presented early (≤ 72 hours) but much higher values of 90.7 % was stated in study in Lagos Nigeria³. Early hospital presentation results in better outcome. Prenatal diagnosis accounts for most of the early referrals to specialized centers with specialized neonatal surgical care. Most low-income countries lack basic facilities, trained and experienced health personnel required for the advance obstetric care. Most pregnancies are supervised in primary health centers that do not have these basic facilities. Results of obstetric ultrasounds in secondary and tertiary hospitals are still a challenge. Previous studies have presented varying degrees of missed prenatal diagnosis of obvious congenital anomalies ranging as low as 1.8% to as high as 96.3% in studies by Abdur-Rahma et al, Shitta et al in Ilorin and Jos in Nigeria respectively^{16,21}.

The outcome of surgical neonate is determined by the nutritional state of the neonate. The weight of the neonate determines the nutritional state of the neonate. This can be improved by maternal education, improved standard of living and effective antenatal policy. Our study observed that the mean weight at presentation was 3.025Kg and 86.1% weighed 2.5Kg and above. This is in contrast lower mean values of 2.6Kg and 2.8Kg recorded in previous studies by Abdur-Rahman et al and Ejirish et al respectively^{16,18}. The outcome of surgical neonates depends on the degree of prematurity, severity of congenital anomalies and associated sepsis. In our study, we observed that 88.9% were products of term delivery and 11.1% were premature neonates. This is similar to the 91 % in the study by Abdur-Rahman et al in Ilorin Nigeria¹⁶. This contrasts with the study by Ejirish et al in Babylon Iraq which demonstrated that all patients were products of term gestation¹⁸.

The 25% risk of sepsis observed in our study was in contrast to study by Abdur-Rahman et al which observed the risk of sepsis in all his patients¹⁶. Our study observed associated sepsis in 38.9%. This is slightly more than the study by Lawrence et al¹⁵. This could be attributed to poor antenatal clinics, poor delivery suits and unethical conduct some obstetric personnels and procedures²⁰. The 30.6% associated congenital malformations observed in our study is similar to the findings of Ejirish et al and Rattan et al.^{18,19}. This is lower than the 50% demonstrated by Louise et al.

Early commencement of sterile wound care prevents surgical site infection and enhances early wound healing. The mean day of commencing the wound care after birth was 69.23 hours and 77.8% commencing early within 72 hours. The mean day of eschar separation was 31.96 days with 53.8% separation within 30 days is in contrast to previous studies that demonstrated less mean of 21.8 days³. Our study observed that the mean weeks from

commencement of honey dressing to complete epithelialization (healing) was 12.19 weeks with 69.2% within 12 weeks. This is in contrast to previous studies by Bode et al in Lagos and Louise et al in Birmingham United Kingdom of 4.9 weeks (34.4 days) and 10.5 weeks (73 days) respectively^{3,5}. This could be attributed to the higher percentages of late hospital presentation, lack of potent antibiotics, lack of standard effective honey and lack of multivitamin supplementation.

Complications were demonstrated in 30.6% of our study. This is similar to previous studies by Louise et al¹⁵. Sepsis accounted for 81.8%. This could be due to the antibiotic's efficacy, the authenticity of the honey, the sterility of the dressing and the design of the special baby care unit to manage surgical neonates. One female patient was noticed to have ruptured on day 30 of the care. She had immediate gentle repair with vicryl 30 and was continued with the wound care. She eventually had complete eschar separation on day 47 and complete healing at 11 weeks. There was no patient in our study that developed enterocutaneous fistula.

The mortality of 30.6% recorded in our study is similar to the study by Burge et al²². This is in contrast to the 4% recorded in the study by Bode et al in Lagos³. Sepsis accounted for 72.7% of the cause of death. The hypoglycaemia observed in our study was frequent and intractable to correction. All the premature neonates in our study died. This could be due to the problems of prematurity and lack of optimal advanced neonatal care. The association of gender (p-value=0.780), age at presentation (p-value=0.780), risk of sepsis (p-value=0.910), associated sepsis at presentation (p-value=0.177) and presence of congenital anomalies (p-value=0.372) with day of eschar separation did not demonstrate statistical significance. Also, the association of gender (p-value=0.118), age at presentation (p-value=0.157), risk of sepsis (p-value=0.539), associated sepsis at presentation (p-value=0.178) and absence of congenital anomalies (p-value=0.855) did not demonstrate statistical significance.

Limitation

The main limitation of this study, apart from being retrospective, is the rather small number of patients involved. A further larger study would further clarify the findings in this study. Different brands of honey from different localities were used during the study. A local study should be done to assess the ideal honey brand in our community.

CONCLUSION

The average healing period of major omphalocele wounds with honey was 12.19 weeks. Prematurity and sepsis were observed to be the determinants of mortality in major omphalocele. Honey is a good

escharotic agent in the conservative management of major omphalocele. The procedure is easy, simple, practical, less expensive, not requiring equipments and can be used in remote areas with less mortality even in developing nations with limited resources. Honey is therefore safe and effective in the topical management of major omphalocele.

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