

# The conservative treatment of giant omphalocele by tanning with povidone iodine and aqueous 2% eosin solutions

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**Aim** The aim of this work was to report the result of nonoperative management of giant omphalocele by dressing with povidone iodine and aqueous eosin in Niger.

**Patients and methods** This prospective study was conducted over 5 years (January 2011 to December 2015) in the Departments of Pediatric Surgery in the country. The procedure consisted of applying povidone iodine at the initial phase of the treatment as inpatient followed by aqueous eosine solution application as outpatient, which was continued up to complete epidermization. The clinical aspects, the complications and the mortality of omphalocele were discussed.

**Results** The study included about 13 patients; the mean age at presentation was 1.7 days (range: 3 h–8 days). The delivery was at home in 38.46% of the cases (five out of 13). The average birth weight was 2810 g. Associated congenital abnormalities were found in 46.15% of cases (six out of 13). The mean initial hospitalization duration was 8 days. The average length of complete epidermization duration was  $9 \pm 2$  weeks. The secondary surgical cure was realized in eight

patients. The morbidity rate was 30.77% (four out of 13). The mortality rate was 23.07% (three out of 13).

**Conclusion** The conservative treatment of giant omphalocele through the application of povidone iodine and aqueous eosine is effective and cost-effective. This procedure should be privileged in our limited resources Health centers where pediatric intensive care unit are lacking. *Ann Pediatr Surg* 13:125–128 © 2017 Annals of Pediatric Surgery.

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## Introduction

Omphalocele is one of the most common congenital anomaly of the anterior abdominal wall [1,2]. It is characterized by herniation of the abdominal viscera through the umbilical ring contained in a translucent avascular sac [1–3]. The diameter of the defect and the content of the sac are predictors of the difficulties in medical care. Omphalocele is called giant when the collar diameter is greater than 5 cm, the circumference of the sac is greater than 10 cm and/or when the sac contains the liver [2,4,5]. The primary surgical closure of this type of omphalocele leads to respiratory and haemodynamic complications [6,7]. Progressive reintegration of the abdominal viscera described by Schuster is the most used technique nowadays but needs general anesthesia with the associated risks in this group of patients. The nonoperative techniques or conservative treatment aimed at progressive epidermization of the sac through the application of antiseptic and secondary surgical cure of the remaining hernia several months after birth [8,9]. The aim of this work was to report our experience on the nonoperative treatment of giant omphalocele using the Grob procedure.

## Patients and methods

This prospective and descriptive study was conducted in the two Departments of Pediatric Surgery of the country (Hospital National de Lamordé and Hospital National de Zinder) over 5 years (January 2011 to December 2015). All patients hospitalized for giant omphalocele and

managed with the conservative technique were included in this study.

Patients with ruptured omphalocele, those lost to follow-up, and deceased patients were excluded.

At admission, patients were hospitalized for clinical and paraclinical investigations to search for other congenital anomalies and also to be sure of a good start of the conservative treatment with a modified Grob procedure [8]. It consisted in tanning the sac with diluted povidone iodine (Fig. 1) with simple dressing with Velpeau band. The dressing is to be changed every 2 days. An antibioprophylaxis was instituted based on ampicillin and gentamicin and the patients were breastfed. At the end of the investigations and when there was no associated malformation, the patient was allowed to follow his or her treatment as outpatient with 2% aqueous eosin (Fig. 2) until complete epidermization. The patient was seen regularly and thyroid hormone was administered a week after the onset of the treatment and after one month. The surgical cure of the hernia was accomplished secondarily.

The studied variables were the gestational age, the way of delivery, the description of omphalocele (diameter and circumference), the delay of epidermization, the age at the cure of the residual hernia, the complications, and the mortality.

Patient's parents granted informed consent before inclusion in the study.

Fig. 1



Omphalocele with early treatment through the application of povidone iodine.

Fig. 2



Omphalocele during treatment by tanning with 2% aqueous eosin.

## Results

We collected 41 cases of omphalocele, among which 13 constituted our sample. The antenatal diagnosis was mentioned in one case. Delivery was in health centers in 76.92% of the cases (10 out of 13), and cesarean section was performed in 38.46% of cases (five out of 13). The mean age at admission was 1.7 days (range: 3 h and 8 days). The average birth weight was 2810 g (range: 2530 and 3970 g). Associated malformations were found in 46.15% of the cases (two cases of interventricular communication, a case of polydactyly, a case of Beckwith–Wiedmann syndrome and two cases of abnormal migration of testis). The average initial hospital stay duration was of 8 days (range: 4–17 days). The average time to complete epidermization was  $9 \pm 2$  weeks (Fig. 3). The secondary surgical treatment was performed in eight patients; two were lost to follow-up and three are waiting for the closure of the residual self-disembowelment. The morbidity rate was 30.77% (four out of 13), including two cases of incisional hernia, one case of infection of the sac and one subocclusive syndrome case. The mortality rate was 23.07% (three out of 13). The causes of death in our study were cardiovascular failure in two cases and unspecified in a case.

The summary of our findings is reported in Table 1.

## Discussion

Omphalocele is one of the most frequent congenital anomaly of the anterior abdominal wall; the frequency is about 1/4000 to 1/5000 births [2,10,11]. This frequency is difficult to evaluate in our context taking into account certain sociocultural constraints but also because of the difficulties in access to specialized centers.

Antenatal diagnosis of the omphalocele is relatively easy using obstetrical ultrasound; it allows you to better organize delivery and facilitate support for these children. However, many obstacles (insufficient qualified staff and appropriate materials) slow down the development and the popularization of this diagnosis in our countries [12,13]. The discovery of the omphalocele was almost always an obstetric incidental finding in our study, and antenatal diagnosis has been mentioned only once.

The antenatal diagnosis may be of interest in medical care but has no predictive value for the type of delivery. For some authors, the antenatal discovery of an omphalocele, even the giant form, is not an indication for cesarean section except when there was fetal distress [14]. For others, cesarean section must be systematic in case of giant omphalocele to avoid rupture of the sack or hepatic lesions. In our study there were other maternal or fetal indications of cesarean section.

The conservative management of giant omphalocele is an alternative to primary closure, which can lead to increased intra-abdominal pressure, which can cause haemodynamic and ventilator disturbances [9]. Local application of antiseptics on the sac gives progressive epidermization of the sac and scheduled closure of the defect. This procedure may take time but has safety advantages, especially in our countries where neonatal surgery is difficult to realize. The average time for complete epidermization in our study was  $9 \pm 2$  weeks.

This average time is similar to those reported in the literature [8,13,15,16]. The mainstay of this treatment remains unchanged since the study by Ahlfeld in 1899 [17], who used alcohol as antiseptic. Since then, many antiseptics have been used: mercurochrome, silver nitrate, and silvered

sulfadiazine [17,18]. The good tolerance of aqueous eosin, its availability, and its cost-effectiveness were reported by many authors [13,15]. However, the dilemma persisted about the usage of povidone iodine because of the transient hypothyroidy. This transient hypothyroidy caused by the Wolff Chaikoff effects related by some authors [18,19] is not constant and did not constitute a real contraindication of the usage of povidone iodine in the treatment of giant omphalocele [20,21]. The usage of povidone iodine in our study was well tolerated, and no thyroid hormone disturbances were recorded.

Complications such as sepsis, rupture of the sac during treatment, and dynamic and ventilatory disturbances were reported by many authors as main complications during the conservative management [4,13,15,22]. Incisional hernia was the main complication in our study; cases of ruptured sac were excluded from the study. Overall mortality was 23.07%, which is closer to that related by Kouamé *et al.* [15]. Generally, the mortality rate is lower with conservative management, especially in Grob procedure [3,15,22–24].

Apart from the perinatal management, the prognosis of giant omphalocele could be influenced by many factors, such as associated malformations, gestational age and birth weight [13,20,25]. In developing countries, the lack of antenatal diagnosis and neonatal intensive care unit, the delayed diagnosis, and structural and organizational problems of institutions are the main factors of poor prognosis.

## Conclusion

Many studies have shown interest in the use of tanning aqueous iodine in the conservative treatment of giant omphalocele. The usage of povidone iodine is efficient but contested. With the treatment of povidone iodine and 2% aqueous eosin, we record satisfactory results. It

Fig. 3



Complete epithelialization.

Table 1 Summary of observations IVC, inferior vena cava; TMA, transmetatarsal amputation; WBS, Wiedemann–Beckwith syndrome.

No.	Birth weight (g)	Age at admission (h)	Delivery route	Associated malformations	Delay epidermization (weeks)	Thyroid function	Age of the treatment of residual hernia (months)	Complications	Death
1	2530	20	Cesarean section	IVC	8	Euthyroid	30	No	Yes
2	2575	12	Vaginal delivery	No	6	Euthyroid	24	Eventration	No
3	2600	3	Cesarean section	Polydactyly	10	Euthyroid	Waiting	Sac infection	No
4	2750	9	Vaginal delivery	No	9	Euthyroid	Lost view	–	–
5	2660	24	Vaginal delivery	No	11	Euthyroid	27	No	No
6	3970	192	Cesarean section	WBS	10	Euthyroid	24	No	Yes
7	2710	36	Vaginal delivery	IVC + left TMA	8	Euthyroid	Waiting	–	No
8	2800	24	Vaginal delivery	No	9	Euthyroid	36	No	No
9	2970	24	Vaginal delivery	Right TMA	9	Euthyroid	42	No	No
10	2550	24	Vaginal delivery	No	11	Euthyroid	36	Eventration	No
11	3050	92	Cesarean section	No	6	Euthyroid	28	Subocclusif syndrome	Yes
12	2670	48	Cesarean section	No	8	Euthyroid	Waiting	–	No
13	2700	36	Vaginal delivery	No	9	Euthyroid	Lost view	–	–

constituted a real alternative to the operative difficulties of newborn babies, especially in our institution lacking neonatal intensive care unit.

### Conflicts of interest

There are no conflicts of interest.

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