Technical Innovation

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Umbilicoplasty in children with huge umbilical hernia

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ABSTRACT

Background: Huge umbilical hernias (HUH) are voluminous umbilical hernia (UH) that are frequent in black African children. Several surgical techniques are used in their treatment for umbilical reconstruction, but techniques using skin flaps provide better aesthetic results. In this study, we presented our technique of umbilicoplasty in HUH, and its results. **Patients and Methods:** It is a retrospective study on children treated for HUH, from January 2012 to December 2013. The UH was called HUH when its basis diameter (BD) exceeds 3 cm. Every HUH was characterised by its height, BD and morphology. Our technique was a two lateral flaps technique; the flaps are symmetrical and drawn so as to reconstitute the different parts of the umbilicus. The results were appreciated with criteria, including the peripheral ring and the central depression of the neo-umbilicus. **Results**: Twelve children were concerned (7 boys and 5 girls). Their mean age was 5 years and 6 months. The mean BD was 5.6 cm (extremes 3 and 8 cm), and the mean height of the HUH was 7.45 cm (extremes 3 and 9 cm). All underwent umbilicoplasty. In early post-operative period, two children presented a transitory subcutaneous hematoma. Late complications were granulation tissue with two children, and cheloid scar with one. With a mean follow-up of 10 months, we had 10 excellent results and two fair results according to our criteria. **Conclusion:** Our two lateral flaps umbilicoplasty is well-adapted to HUH in children. It is simple and assures a satisfactory anatomical and cosmetic result.

Key words: Children, huge umbilical hernia, Togo, umbilical hernia, umbilicoplasty

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INTRODUCTION

Umbilical hernia (UH) is a frequent pathology in children; it would be more frequent in black children, and its frequency can reach 50% of children in some African regions.[1] The treatment of UH generally consist of surgical closure of the umbilical ring and the re-fixation of the umbilicus.[2] Huge umbilical hernias (HUH) are voluminous UH; for their treatment, the excess of skin remains a problem to the surgeons, after closure of the umbilical ring. To restore an umbilicus aesthetically near to the natural one, many techniques of umbilicoplasty have been described.[3-6] We herein report the results of umbilicoplasty with our technique, which is simple and permits to reconstitute a regular and aesthetic umbilicus.

PATIENTS AND METHODS

This is a retrospective study, carried on files of children aged <15-year-old, treated in the Department of Paediatric Surgery of Sylvanus Olympio Teaching Hospital of Lomé from 1st January 2012 to 31st December 2013 for HUH. We called HUH, every UH whose basis diameter (BD) exceeds 3 cm, and whose height exceeds 1.5 cm. The Figure 1 shows how to measure the BD and the height. We described therefore two classifications:

- According to the BD of the HUH we distinguished three groups:
  1. Group 1: 3 cm < BD ≤5 cm
  2. Group 2: 5 cm < BD ≤7 cm
  3. Group 3: BD >7 cm.
- According to the morphology of the HUH, we distinguished also three types: Sessile, pediculate, or horn-like HUH.

Description of the technique

It is a technique of two lateral flaps, performed under general anaesthesia with a good muscle relaxation. We drew first, the xypho-pubic line, going straight over the summit of de HUH. Two pullwire were placed

at the summit of the HUH, up and down in order to maintain the HUH tight during the procedure. Some landmarks were placed on the HUH as shown by Figure 2. The points A and D were placed at 1 cm of the HUH basis. The points B1 and B2, C1 and C2 were placed, respectively each in front of the other, on the basis of the HUH, at its middle part according to its basis circumference. One must not consider the native umbilical scar, which is displaced in the HUH.

The segments B1C1 and B2C2 were equals and correspond to the basis of the flaps. Their length (L) depended on the diameter (d) of the neo-umbilicus to be made. The two values were joined by the following formula: $L = \frac{\pi}{2} d$. In children we usually choose to make a neo-umbilicus of 2 cm of diameter. For this, L equals approximately π (3.14) and we choose 3 cm.

The points E1 and E2, F1 and F2 were placed as nearer as possible to the xypho-pubic line, in order to have in the beginning, the maximal height of the flaps. The definite height of the flaps (h) depends on the thickness of the abdominal subcutaneous panniculus (t). We usually take this formula: $H = t + 0.5$ cm. The segments E1F1 and E2F2 were equal and symmetric and measured 0.5 cm. The flaps so drawn must be perpendicular to the xypho-pubic line.

The incisions were not straight, but semi-circular or arc-like. Incisions had a superior concavity from A to B (B1 and B2) and from B to E (E1 and E2), and inferior concavity from F (F1 and F2) to C (C1 and C2) and C to D. The incisions were joined at A and D at a point, whereas they were rounded at B1, B2, C1 and C2. The two lateral flaps looked like towers widened to their bases.

After this drawing, incision was done on the marks. The flaps were removed from the aponeurosis plan with their subcutaneous panniculus. In the same way, all the lateral skin was dissected with its subcutaneous panniculus from the aponeurosis plan. The skin was also removed from the aponeurosis of the umbilical sack, and the sack was opened at his top. The excess of aponeurosis was resected longitudinally; the level of resection was well checked in order to have good and sufficient tissue for a regular and strong new aponeurosis plan that will not allow eventration, and that will provide a regular shape to the abdomen. One can notice that the curvature of the incisions up and down changes after peripheral skin separation [Figure 3]. The height of the flaps was reviewed as specified earlier. Their summits were correctly

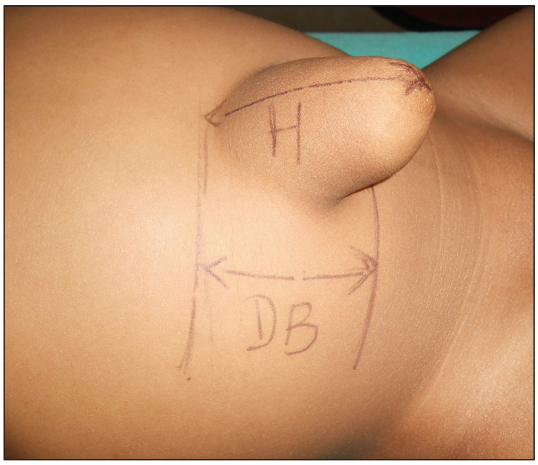


Figure 1: Measurement of the basis diameter or diameter of the basis (DB) and the height (H) of a huge umbilical hernia. Here, it was a Group 1 huge umbilical hernia (DB = 4.5 cm and H = 7.5 cm)

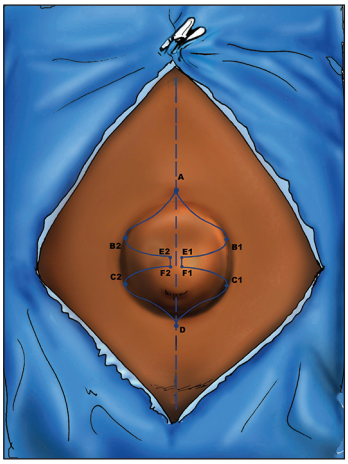


Figure 2: Drawing of landmarks and lines of incisions for the umbilicoplasty

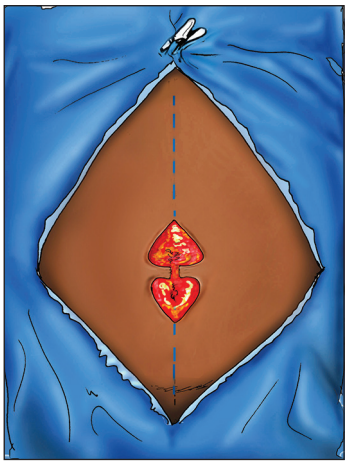


Figure 3: Aspect after removing of the excess of skin and closure of aponeurosis plan

sutured one to the other, and fixed by two points to the aponeurosis plan by 2/0 absorbable suture. Their sides were sutured by subcutaneous separated

points of 4/0 absorbable suture, from depth to surface. After this, the neo-umbilicus was well drawn, with its peripheral rim well raised. Two separate points were placed at the superior and the inferior part of the neo-umbilicus. The remainder wound is closed with two plans: The subcutaneous plan by separated points, and an intradermal continuous suture, both with 4/0 absorbable suture. The definite aspect of the umbilicoplasty was then obtained [Figure 4].

Appreciation of the results

We appreciated the results as excellent, fair or bad according to criteria in Table 1. In addition to these criteria, we have the self-appreciation of the surgeon, and the appreciation of the parents or the child. We asked the parents or the child how they appreciated the neo-umbilicus. From their answers, we classified the outcome of the umbilicoplasty as:

- Excellent (if the answer was: "The neo-umbilicus looks like a normal umbilicus"),
- Fair (if the answer was "the neo-umbilicus is better than before"), and
- Bad (if the answer was "we prefer the anterior aspect of the umbilicus").

RESULTS

During our study period, there were 146 children admitted in our Department with UH, among which 22 had HUH. Four children presented with UH incarceration, but none of them had HUH. HUH represented 15.06% of UH in our Department. Only 12 over the 22 have been operated. There were seven boys and five girls. Their mean age was 5 years and 6 months with extremes of 6 months and 13 years. The mean BD was 5.6 cm (extremes 3 and 8 cm), and the median was 5.5 cm. The mean height was 7.45 cm (extremes: 3 and 9 cm), and the median was 6.5 cm. The classification according to the group and the type of HUH is presented in Table 2. All the children underwent umbilicoplasty. The mean duration of the operation was 73 min (extremes: 45 and 90 min). The mean hospitalisation stay was 3 days (extremes: 2 and 4 days).

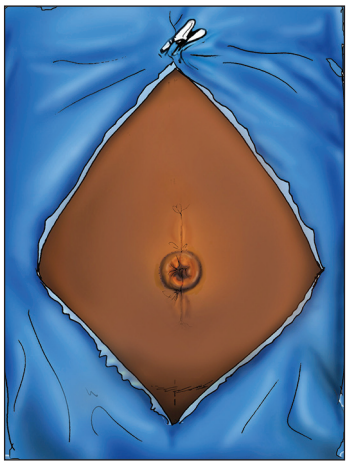


Figure 4: Neo-umbilicus obtained after closure of the skin

During the post-operative period, we notice a subcutaneous hematoma, which was resorbed within 7 days. During the follow-up, two children presented granulation tissue at the centre of the neo-umbilicus depression, and another child developed cheloid scar. Granulation tissue occurred 5 and 6 weeks after operation. One (the biggest) healed after surgical resection and good closure of the skin upon the aponeurosis. The second healed with application of nitrate 2 times a week during 3 weeks.

With a mean follow-up of 10 months (extremes: 5 and 20 months), and according to our criteria, we had 10 excellent result [Figures 5a-c] and two fair results. The two fair results were related to flattened neo-umbilical rim. For the parents (or children), the results were excellent.

DISCUSSION

The treatment of HUH in children includes two actions: The closure of the umbilical ring and the reconstruction of an umbilicus close to the normal. There is often no problem of hernia incarceration with HUH[5] as noticed in our series. The best attitude would be the operation of the HUH before the school age, in order to avoid mockeries of friends at school. The closure of the umbilical ring by suture of the aponeurosis plan is usually easy and doesn't need prosthesis material. The problem remains

Table 1: Appreciation criteria of the umbilicoplasty

Appreciations parameters	Excellent	Fair	Bad
Aspect of peripheral rim	Raised	Flattened	Depressed or exuberant
Aspect of the central depression	Deep	Little deep	Absente

Table 2: Repartition of the huge umbilical hernia according to their group and their type

Type Group	Sessile HUH	Horn-like HUH	Pediculate HUH	Total
Group 1	1	0	0	1
Group 2	3	0	1	4
Group 3	4	2	1	7
Total	8	2	2	12

HUH: Huge umbilical hernia



Figure 5a: Group 2 (basis diameter = 6 cm; height = 5 cm) and sessile huge umbilical hernia in a girl of 4 years old (before operation, on the operating table)



Figure 5b: Immediate post-operative aspect of the neo-umbilicus



Figure 5c: Aspect of the neo-umbilicus 17 months after operation

at the umbilicoplasty. It needs to be simple to perform, to provide a cosmetic and permanent result with no external scar.[7] Many techniques have been described,[4-9] some more complex than others, with variable results. We aimed at developing a technique easy to perform with precision, and that provides satisfactory results. A simple umbilication of the skin after resection of the excess of skin[9] cannot restore the different parts of an umbilicus. The morphology of the umbilicus must not influence the drawing of the flaps. The flaps must be drawn perpendicularly to the xypho-ombilical line, and must not follow the direction of the HUH.

The umbilical rim

It determines the cosmetic aspect of the umbilicus. It gives to the neo-umbilicus, its diameter (d). It is raised with young children and become little flattened when the abdominal panniculus thickens. The curvature of our incisions especially at points B1, B2, C1, C2 [Figure 2] permitted us to raise the umbilical rim [Figures 4 and 5b]. In addition, the height of flaps must pass the thickness of the abdominal panniculus by about 0.5 cm. The regulation of the flaps height according to the thickness of abdominal panniculus is very important: Short flaps lead to depressed rim; in other hand, too long flaps can lead to exuberant rim that will not be cosmetic. We had no depressed or exuberant rim in our series. Other techniques[4,6] try to reconstitute a raised rim but it can be irregular or incomplete. In our technique, symmetric flaps with equal height and equal basis permit to have regular and complete rim. The diameter of the umbilical rim depends on the width of the flaps at their basis (L). We usually choose 3 cm for the L in children, in order to have an umbilical rim of 2 cm. One can choose to create a neo-umbilicus with a rim more or <2 cm large, according to the age and the morphology of the child. In that case, the formula $L = \frac{\pi}{2} d$ must be used.

The central depression of the umbilicus

It is the second element constituting the umbilicus. Its depth gives to the umbilicus, its particularity. Without this depression, we cannot have an umbilicus. In our technique, the fixation of the flap's summit to the aponeurosis plan permits to create this depression. Other techniques of umbilicoplasty[4-8,10] do that fixation with the same purpose.

The added scar

The avoidance of an added scar is the very challenge of all the techniques of umbilicoplasty. The surgeon must create a neo-umbilicus close to the normal, without added scar if possible. The absence or not, and the length of the added scar (LAS) is related to the BD of the HUH. The "lazy M" and omega flaps technique[5] can permit to have a neo-umbilicus without added scar but only in UH with reduced BD, <3 cm. With

the double half-cone umbilicoplasty,[11] after 3 cm of fascial defect, the cosmetic result will be discussed because the neo-umbilical rim will be too large. The technique of Ikeda *et al*.[12] is adapted for UH that BD is between 2 and 2.5 cm; it cannot provide good result with what we call HUH. With HUH, even in Group 1, there will be an added scar, even with the "lazy M" and omega flaps. The other techniques[4,6,8] as ours let an added scar whose length depend on the BD of the HUH. We noticed in our series that how long was the added scar, the results were excellent for children and parents, and they preferred the neo-umbilicus with added scar to the HUH. With a neo-umbilicus of 2 cm of diameter (d), if we consider 1 cm added up and 1 cm added down during the drawing, the LAS can be calculated: LAS = BD – d + 1 + 1 = BD – 2 + 2 = BD.

Thus, the LAS equals the BD, and this length is distributed approximately for half up and half down the neo-umbilicus. Hence, more is the BD, more will be the LAS, because the excess of skin that may be excised begins at the basis of the HUH. The LAS is independent to the morphology of the HUH. Our classification in three groups according to the BD permits us to know how long will be the LAS. The maximum care must be given to the closure of the incision, in order to let a scar less visible as possible; one must avoid skin transfixing separate points, and use intradermal continuous suture. We are working to improve our technique in order to reduce the LAS at least in Group 1 HUH.

Post-operative complications

Subcutaneous hematoma can occur in early post-operative period (one case in our series). It regresses spontaneously. Other complications like parietal infection in 5% and erythema of flaps in 29.2% were found by Kaneko and Tsuda.[6] The late complications that we encountered were cheloid scar (one case) and granulation tissue (two cases). Cheloid scar reduces the cosmetic aspect of the neo-umbilicus but is preferred to HUH. If the patient has some cheloid scar before umbilicoplasty, subcutaneous injection of corticoid in the edge of incision just after healing of the wound could help to avoid it. As for granulation tissue, they are due to insufficient closure of skin at the summit of the flaps before their fixation to the aponeurosis. In their study, Takasu and Watanabe[4] they have found it at the centre of the neo-umbilicus in 9%, and in the gap between adjacent skin flaps in 4% of cases. A correct closure of the summit and the gap between the flaps permits to avoid them.

Post-operative eventration must not been found.

CONCLUSION

Our umbilicoplasty is a simple and precise technique, which provides excellent aesthetic result. Among the multiple techniques described, it is well adapted to HUH often encountered with African children. A good application of the technique permits to avoid post-operative complications. Despite the added scar, the results are excellent. Nevertheless, the surgeon must look hard for the way to reduce the LAS.

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