

## CHALLENGES IN THE REPAIR OF LARGE ABDOMINAL WALL HERNIAS IN NIGERIA: REVIEW OF AVAILABLE OPTIONS IN RESOURCE LIMITED ENVIRONMENTS

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### ABSTRACT

**Objective:** To evaluate the challenges and outcome of management of large abdominal wall hernias in a resource limited environment and highlight the options available to surgeons in similar conditions.

**Design:** A review of prospectively collected data on large abdominal wall hernias managed between 2003 and 2009.

**Setting:** University of Nigeria Teaching Hospital, Enugu, Nigeria and surrounding hospitals

**Subjects:** Patients with hernias more than 4cm in their largest diameter, patients with closely sited multiple hernias or failed previous repairs and in whom the surgeon considers direct repair inappropriate.

**Outcome measures:** Demographics of patients with large hernias, methods of hernia repair, recurrences, early and late complications following the repair.

**Results:** There were 41 patients, comprising 28 females and 13 males with ages 14 - 73 years. Most (53.7%) were incisional hernias. Gynecological surgeries (66.7%) were the most common initiating surgeries. Fifteen of the patients (36.6%) have had failed previous repairs, 41.5% were obese, five patients presented with intestinal obstruction. Thirty nine of the hernias were repaired with prolene mesh, one with composite mesh and one by darning technique. Most of the patients had extra peritoneal mesh placement. Three patients needed ventilator support.

After a mean follow up of 18.6 months, there was a single failed repair. Two post op deaths were related to respiratory distress. There were 12 wound infection and 8 superficial wound dehiscence, all of which except one resolved with dressing. One reoperation was done following mesh infection and extrusion.

**Conclusion:** Large abdominal wall hernia repair in resource limited environments present several challenges with wound infection and respiratory distress being the most notable. Surgeons who embark on it in these environments must be prepared to secure the proper tissue replacement materials and have adequate ventilation support.

**Key Words:** large abdominal wall hernias, giant hernias, mesh repair.

*(Accepted 20 April 2009)*

### INTRODUCTION

Abdominal wall hernias more than 4cm in their largest diameter are usually considered large. Such hernias have a 3 fold increase in risk of recurrence after repairs.<sup>1</sup> When hernias are up to the size of human heads, they are described as giant hernias.<sup>2</sup> These hernias are of particular concern not only for the high recurrence rates among them but also for the challenges that follow their repair, In most third world countries, neglected primarily occurring ventral hernias used to be the main cause of large abdominal wall hernias.<sup>2</sup> Recently however, incisional hernias are becoming predominant and these hernias often progress to become giant hernias within a short time. The challenges that arise from

these large hernias have been mentioned previously in texts and literature.<sup>2, 3</sup> Many of the patients present with serious co morbid diseases like obesity, hypertension, ascitis, abdominal swelling, chronic cough and intestinal obstruction. These increase the risk of surgical treatment of the hernias. There are also problems of loss of domain due to prolonged housing of intra abdominal viscera outside the abdominal cavity. Anaesthetic problems may arise from sudden increase in intra abdominal tension when the hernia contents are reduced or from attenuated respiratory muscles that make it difficult for the patients to ventilate themselves post op. Abdominal hypertension can also lead to serious intra operative and post operation hypotension due to compression of the inferior vena cava. Prolonged pressure from the hernia contents may lead to skin problems like attenuated skin, ulceration and infection,

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depigmentation or hyperpigmentation of the skin. Some of the hernias have undergone multiple failed previous repairs and virtually all of them have problem of large fascia defects that make direct closure inappropriate.

Many of these challenges have been surmounted in developed and developing countries with good access to modern surgical and anesthetic supports; like ventilators, synthetic mesh materials and laparoscopic expertise and facilities. Surgeons in many developing countries lack access to these facilities and yet it is within these populations that large and giant hernias are more likely to be encountered because of less attention to health care issues. In this report, we review the initial experience of our unit in the repair of these hernias at the University of Nigeria Teaching Hospital Enugu and use that experience to discuss some of the viable options that surgeons in resource limited environments should consider in meeting the challenges of these difficult hernias.

## MATERIALS AND METHODS

Starting from June 2003, consecutively presenting patients who had abdominal wall hernias and who fulfilled the inclusion criteria were prospectively recruited into the study. All the patients were managed by either of the authors at the University of Nigeria Teaching hospital Enugu or the adjoining mission hospitals in Enugu (*Ntasiobi Ndi Nonafufu* Specialist Hospital and Annunciation Specialist Hospital). Inclusion criteria were patients with large hernias (>4cm in the widest diameter). Also included were patients with smaller hernias which were recurrent or multiple and which in the opinion of the surgeon, a direct tissue repair will put the abdominal wall under tension. After evaluation, each patient was informed of the particular problems of the hernia and the planned measures to prevent recurrence of the hernia. Informed consent was obtained from every patient. All active infections were cleared before hernia repair.

At the point of first contact, a detailed clerking was done. Each patient's age, height, weight and presenting complaints were recorded. Also noted were the number of previous repairs, associated diseases present, site and size of the hernia, any previous initiating surgery, presence of obesity, other predisposing conditions and duration of the hernia. Each patient had the haematocrit, electrolyte and urea checked. Other parameters noted were antibiotics used, use of DVT prophylaxis, the operation done, the findings at surgery, size of defect at surgery, duration of surgery, blood loss, type of mesh used, placement of the mesh, units of blood transfused and type of drain used. Post op evaluation

included haematocrit checks, presence of respiratory distress, wound infection, wound dehiscence, wound hematoma, or seroma, length of admission, duration of follow up as well as recurrences and times to recurrence.

Follow up telephone interview was conducted in November 2007 and January 2008 and a final interview in November 2009 to assess long term post repair problems. Patients who complained of any problem were invited to the clinic for clinical evaluation. Follow up was until recurrence or death which ever occurred first.

## RESULTS

Forty one patients were treated under this protocol. There were 28 females (68.3%) and 13 males (31.7%). The ages range from 14 years to 73 years with a mean age of 47.3 years and median age of 50 years. Twenty patients (48.8%) had incisional hernia, 7 (17.1%) had inguino-scrotal hernias, 8 had paraumbilical hernias (Figures 1). One patient had combination of paraumbilical hernia with incisional hernia while another one had a combination of paraumbilical hernia and inguinal hernia. One of the patients was a reoperation in our service for mesh infection and extrusion. Five patients presented with intestinal obstruction while 15 patients (36.6%) had recurrent hernia after failed previous repairs. Included in the series were two patients that had abdominal wall defects that needed mesh repair following tumour resection

Table 1 shows the predisposing surgeries among the group of patients with incisional hernia. Gynecological procedures especially caesarean sections were predominant, followed by laparotomy for other abdominal conditions and appendectomy. The duration of the hernias before their repair ranged from 5 month to 18 years with most of them coming for repair after 2 - 5 years. Apart from surgery, other associated predisposing factors were ascitis, chronic cough, steroid abuse and child birth. Twenty seven patients (65.9%) had other co-morbid conditions like obesity in 17 patients (41.5%), 8 of whom were severely obese and 4 morbidly obese, high blood pressure (10 patients), diabetes mellitus, anterior abdominal wall tumour, asthma and cholelithiasis in 2 patients each. Decompensated cirrhosis, intrahepatic biliary obstruction, drug induced Cushing's syndrome, hypertensive heart disease, blindness, retroviral infection, bilateral vaginal hydrocele and secondary infertility occurred in one patient each.

The estimated sizes of the hernias ranged from 8cm<sup>2</sup> to 1600cm<sup>2</sup> with a mean size of 128cm<sup>2</sup>. Fifteen patients have had previous repairs ranging from once (7 patients), to five times (1 patient). All the hernias were on the anterior abdominal wall. Eleven hernias

Were located in the periumbilical region, 10 hernias were located within the central abdomen, seven were right or left inguinal hernias, five each were infra umbilical midline hernias and right or left iliac fossa hernias, three were at midline in supra umbilical area while two were at the right upper abdominal quadrant.

All the hernias were repaired with general or spinal anesthesia except two patients with inguino-scrotal hernia and one with incisional hernia who had local anaesthesia. Thirty nine hernias were repaired with prolene mesh (Figure 1 & 2), while composite mesh and danning technique with nylon sutures each was used on one patient. Thirty seven patients had extra peritoneal mesh placement while four patients had intra peritoneal placement. The omentum was used to shield the gut in all patients that had intra peritoneal placement. The mesh was placed as an underlay in 9 patients, in-lay in 8 patients, on-lay in 6 patients and sandwich technique in one patient. The method of placement was not specified in 17 patients. Except for 5 patients, all the wounds were drained with closed simple tube drains (34), suction drains (4) or both (1).

Thirty eight patients have been followed for a mean follow up period of 18.6 months, with longest at 45 months and the shortest at 9 weeks. Three patients were excluded from the long term evaluation due to loss to follow up (1 patient) and periop death (2 patients). There was one mesh infection with extrusion of mesh (2.6%). This occurred in a lady who had giant hernia with associated morbid obesity, asthma, hypertension and drug induced Cushing's syndrome (Figure 3). This patient was reoperated in our service after 38 months of the initial surgery. At the reoperation, subclinical defects at the junction of mesh with body fascia were noted. This is the only case of failed repair/recurrence (2.6%). There were 12 wound infections (31.6%). All of them, except the infected mesh mentioned above healed on wound dressing. There was partial wound dehiscence in 8 patients (21.1%), one of which had secondary wound closure. One patient each had post operative haematoma and seroma. These needed prolonged drainage and repeated aspiration to resolve. Post op respiratory distress occurred in 3 patients. Two of these were from abdominal hypertension while a third one had post op pulmonary oedema in addition to a possible abdominal hypertension. Two procedure related deaths were from among these patients that had post op respiratory distress. Two other patients died 14 months and 8 months after repair of their hernias from progression of liver disease and colonic cancer respectively. Apart from the single case of mesh infection, the other long term complaints were pain (6 patient), numbness (1), and stitch granuloma at the site of the operation.

Figure 1: **Large paraumbilical Hernia. Pre-op.**



Figure 2: **Same patient in figure 1, Proplene mesh placed as inlay.**



Figure 3: **Giant hernia with loss of domain.**



Figure 4: **Ruptured hernia with skin problems (not part of this series)**



**Table 1: Predisposing Surgeries.**

<b>Predisposing Surgery</b>	<b>Frequency</b>	<b>Percent</b>
Gynaecological surgeries/conditions	14	66.7
- C/S	12	
- Other gynaecologic surgeries	2	
Laparotomy for other conditions	5	23.8
Appendectomy	3	14.3
Umbilical hernia repair	1	4.8
Cholecystectomy	1	4.8

Some patients had multiple surgeries as the initiating surgical procedure.

## DISCUSSION

Hernias are one of the most common problems encountered in surgical practice, yet they can task the skills and resources of even the most astute of surgeons. When these hernias are large, multiple or complex, they present serious challenges to the surgeon. Many of them are already recurrent.<sup>3</sup> Current reviews recommend a long term recurrence rate of 0 - 10%.<sup>4</sup> Consensus recommendations for management of these hernias are that mesh replacement should be used for all incisional hernias, and for other ventral hernias with diameters more than 4cm, while recurrent hernias are best repaired by laparoscopic approach.<sup>4-6</sup> Apart from use of mesh materials, various other techniques like component separation technique,<sup>5, 7</sup> use of tissue expanders,<sup>8</sup> progressive pneumoperitoneum<sup>9</sup> and staged repairs<sup>3</sup> have been advocated for extremely large and complex hernias. The resource limited surgeon may not have all these options available, yet he/she has to manage some of the most difficult of these hernias. We have presented here, our experience in the repair of such large abdominal wall hernias so as to highlight these limitations.

More than 36% of our patients have had failed previous repairs. This is certainly a high recurrence rate for primarily repaired hernias and may be related to the very low frequency of use of mesh materials by Nigerian surgeons in the repair of large hernias. Until recently, Nigerian surgeons, for several reasons including fear of infection, non availability of materials, cost of procurement as well as low level of awareness, have kept away from use of synthetic materials in repair of soft tissue defects.<sup>10</sup> Except for the reoperated case in our service, none of the patients with recurrent hernias in this series has had

previous mesh repair. The very high rate of wound infection and wound dehiscence in this our series is a vindication of these fears. However, this should not be since most of the complication noted in this our series are minor wound complications that heal with dressing. The high rate of failed repairs in larger hernias and complex hernias may also be related to the high incidence of associated co morbid conditions in such hernias. These not only contribute to the development of the hernia but also make the surgery a high risk procedure. In our patients, more than 65% of the patients have other co-morbid conditions, including decompensated cirrhosis, morbid obesity and drug induced Cushing's syndrome. Some of these needed special precautions during surgery to avoid recurrence or complications. When the contents of a large hernia have been housed outside the peritoneal cavity for a long time, the resultant loss of domain may lead to abdominal compartment syndrome during and after the surgery. The use of mechanical ventilators with positive pressure ventilation has made it possible to overcome the consequences and to manage most of them in a one stage procedure. Three of our patients needed post op ventilator support, two from abdominal compartment syndrome (figure 3) and the third had pulmonary oedema in addition. Indeed respiratory distress and respiratory failure is thought to have been responsible for the two deaths in this series. In a hospital like ours with only two functioning ventilators, ventilator support and ICU admissions might be huge drains on resources.

There may be other options to consider in overcoming the challenge of loss of domain, especially for surgeons in resource limited environments.

Pre-op progressive pneumoperitoneum using nitrogen, carbon dioxide or room air over several weeks has been used to increase the volume of the abdominal cavity.<sup>9</sup> The feasibility of this procedure in poor countries may be in question. In addition it has other risks like visceral injury, peritonitis, abdominal compartment syndrome, air embolus, respiratory compromise, and subcutaneous emphysema.<sup>3</sup> The abdominal cavity can be closed with absorbable or composite mesh (if available). These can be periodically adjusted in a staged procedure until the whole contents are reduced.<sup>3,11</sup> Surgeons in resource limited environments can consider preoperative external pressure using abdominal binders which can be tightened over weeks to reduce the content into the abdominal cavity. Such measures have shown excellent results in children with large hernias resulting from omphaloceles.<sup>12</sup> This may however not be feasible in adult patients with loss of domain in which the contents hang parallel to the abdominal wall as in figure 3.

There is also the theoretical risk of entrapment of the contents of the hernia by the girdle or bandage leading to strangulation. Other surgeons have used the option of resection of some segments of the gut to make room for the more critical organs to be accommodated.<sup>2</sup> This option is limited by the amount of intestine that can be sacrificed in this benign condition and also that this approach converts an otherwise clean surgery into a contaminated or even dirty surgery. Other options include crushing of phrenic nerve on one side and creation of iatrogenic temporary hernia through a transverse incision in the epigastrium.<sup>2</sup>

Skin problems may arise in large hernias as a result of traction or pressure necrosis leading to devitalized skin, ulceration and infection. Occasionally, the hernia sac may rupture (Figure 4), especially if native concoctions have been applied on it. Devitalized skin rarely poses a big problem if there is no active infection. Invariably such skin has been stretched enough by the hernia to allow adequate closure after excision of the devitalized area. The problem may become more complicated in cases of extensive ulceration, especially when native concoctions have been applied on the hernia. Use of mesh repair here may be unwise but if inevitable, absorbable mesh is preferable. Autogenous tissue repair with local or regional flap or skin grafts should be considered in resource poor environments. Our approach in active infection has been to delay the repair until the infection has been controlled. If the hernia has ruptured, simple closure of the hernia with delayed absorbable sutures allows the infection to be controlled before repair is instituted.

Perhaps the most problematic area in large hernia repair is when to use and what to use in bridging the fascia defect of the hernia. Many studies have shown that the key to proper hernia surgery is tension free repair.<sup>6</sup> The most common cause of failed repair is attempt at direct tissue approximation in large hernias especially when they are recurrent.<sup>6,13,14</sup> Various tissue replacement options and reconstruction techniques have been described so as to achieve tension free repair.<sup>7-11</sup>

The general surgeon working in resource poor environments may not have all the synthetic tissue replacement options available and may not have the experience or services of a plastic surgeon for some of the reconstructive procedures. We used Danning technique in one of our post appendectomy incisional hernia.

Danning technique however is not a tension free repair and is limited on the size of hernia that can be repaired with it. Outside this series, we also have had experience with the use of tensor fascia lata as tissue replacement for large hernia defects. However, such autogenous free fascia transports invariably fail after about a year because of inherent weaknesses created by blood vessels that pass through them. When used as a vascularised pedicled flap, it can avoid this problem of early failure but its use is limited to moderately sized infra umbilical defects.<sup>4</sup> Some authors have described the use of preoperative tissue expansion in extremely large defects especially after temporary abdominal wall closure procedures.<sup>8</sup> This may also have the same limitation of cost and availability as mesh materials. A much more useful option for surgeons in resource poor countries where synthetic materials are not available is various types of loco-regional flaps. Local transposition of rectus sheath using the component separation technique<sup>7</sup> is a versatile autogenous tissue replacement option that can be used even in extreme of cases. We have not used this technique in this series because we found the use of mesh easier and faster. If the services of a plastic surgeon are not available, it is definitely worth the time and resources spent in learning this procedure for those surgeons in resource poor countries who hope to be the final stop for large and giant hernias.

## CONCLUSION

Our initial experience in the repair of large abdominal wall hernias shows that the most common problem in a resource limited environment like ours is wound infection and partial wound dehiscence. Most of these however will resolve with a short period of wound dressing. The most lethal complication is respiratory distress but this is infrequent and is evident in the largest of hernias. With a single long term recurrence, two mortalities and single mesh infection, our data suggests that acceptable long term post repair results are achievable in resource poor environments. Every surgeon hoping to manage these hernias in resource limited environments must have access to one of the synthetic tissue replacement materials, be ready to do loco-regional flap surgeries and have adequate anaesthesia and ventilator support.

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