

## SKIN CLOSURE AFTER GROIN HERNIA REPAIR IN CHILDREN: A COMPARATIVE STUDY OF THREE SUTURE MATERIALS AND TWO SUTURE TECHNIQUES

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**Objective** The surgical scar is of great importance both to the patient and surgeon. For the patient an ugly scar may not only present a cosmetic problem but in some cases it may also impair function, and the surgeon is always confronted with the problem of possible litigation. This study was undertaken to evaluate the effect of different suture materials and skin suture techniques on surgical scars.

**Patients and Methods** Three suture materials (chromic catgut 3/0, silk 3/0 and nylon 3/0) and two skin closure techniques (transcutaneous interrupted mattress and subcuticular continuous running sutures) were compared in a randomized partially blinded fashion using a groin skin crease incision.

The resulting scars were graded after two years using a conceived three-level scale.

**Results** Subcuticular nylon sutures gave the best cosmetic results followed by subcuticular chromic catgut. Transcutaneous interrupted mattress silk sutures left the worst scars followed by subcuticular continuous running silk sutures.

**Conclusion** The use of suture materials for skin closure is still the norm in developing countries. We therefore suggest that for any particular suture material, the subcuticular continuous running technique should be used and whenever possible the suture material of choice should be nylon.

**Key Words** skin closure, technique, material, surgical scars

### INTRODUCTION

The surgical scar is of very great importance to the patient and of concern to the surgeon. For the patient it may cause functional impairment and/or constitute a cosmetic nuisance<sup>1-3</sup> possibly having an impact on a chosen career and may warrant revision with its attendant implications (complications of anesthesia and treatment, cost of cosmetic surgery etc)<sup>4-7</sup>. For the surgeon it is of concern because apart from the fact that he, of course, is interested in seeing a cosmetically and functionally satisfactory result of his work, on occasion fortunes have been made from litigation due to ugly scars<sup>8-10</sup>. In pediatric surgical practice in a developing country like Nigeria the latter problem is not yet a burning issue because the parents are mostly uneducated. However, with increasing education and children choosing their career a lot of litigation due for unsightly scars may be expected in future.

Scar formation depends on various factors<sup>11,12</sup>, some inherent and others exogenous. In this study we evaluated two exogenous factors affecting the surgical scar, namely the suture material and the suture technique used in our environment.

### STUDY BACKGROUND

Nnamdi Azikiwe University Teaching Hospital being a tertiary health institution in a developing nation has the problem of lack of funds. Facilities are therefore not ideal and not comparable to Western standards. In our pediatric surgery unit, we still use the conventional method of suturing skin incisions because we do not have staples neither do we have adhesive tapes or tissue adhesives. We do not readily have suture material of a gauge less than 3/0 as in other pediatric surgical centers where suture material of 5/0 gauge is common-

ly used. Whenever possible and available, we therefore used 3/0 sutures in our study.

## PATIENTS AND METHODS

Due to the fact that the majority of our elective surgical procedures are hernia and hydrocele repair in the male and because the same skin incision is used in both, we concentrated on these procedures in our study. Therefore, all our patients (n=349) who had elective herniotomy due to hernia or hydrocele between January 1<sup>st</sup> 2000 and June 30<sup>th</sup> 2003 were included. The age range was from 1 month to 15 years.

Exclusion criteria were chronic debilitating illness, immunodeficiency, bleeding disorders, diabetes mellitus and the use of steroids.

A transverse groin skin crease incision was used in all patients. All the operations were done under general anesthesia by the consultant assisted by the senior registrar of the unit or vice versa to maintain a uniform standard for each technique. All sutures were removed on the 8<sup>th</sup> post operative day. Electrocautery was not used near or under the skin.

Three types of sutures of the same gauge (chromic 3/0, silk 3/0 and nylon 3/0) were applied using an atraumatic needle. Two suture techniques were used: interrupted transcutaneous mattress sutures and subcuticular continuous running sutures.

The patients were randomly categorized into five groups according to the type and material used for suturing: Group A (n=69): silk interrupted mattress, Group B (n=70): silk subcuticular continuous running suture, Group C (n=70): chromic catgut subcuticular continuous running suture, Group D (n=70): nylon interrupted mattress and Group E (n=70): nylon subcuticular continuous running suture. This randomization was done by consecutively assigning the patients to the above groups; after every ten patients the group was changed. A second senior registrar who took part in the studies by assessing the scars independently after the operation was not involved in the above randomization.

Thirty-five patients did not complete the study; they were categorized as drop-outs and were not included in the final analysis. Therefore only 314 patients formed the basis of our

analysis with the following distribution of the five study groups: Group A: 63 patients, Group B: 61 patients, Group C: 64 patients, Group D: 60 patients and Group E: 66 patients.

The parameters analyzed were: wound infection, presence of stitch abscess and stitch granuloma. Scar assessment was made every six months and for a minimum period of two years by the parents/patients, the operating surgeons and the senior registrar blinded to the type of suture and technique used. The cosmetic results were evaluated using a conceived three-level scale of 1: very good, 2: satisfactory or fair and 3: inadequate or ugly. Scars were judged very good when they were at the hair line and could not be felt above the skin edge, fair when they were broader and could not be felt above the skin edge and ugly when they were broad and heaped above the skin edges and/or when stitch marks were noticeable.

## RESULTS

In Group A complications were found in the form of 3 (4.8%) wound infections, 5 (8%) stitch abscesses and 2 (3.2%) stitch granulomas. The majority of the scars (47/63, 74.6%) were judged to be ugly; 13 (20.6%) fair and three (4.8%) very good.

In Group B the results were better than in Group A but still not satisfactory. Only one patient (1.6%) had a complication in the form of wound infection, but still 16 out of 61 scars (26.2%) were considered ugly, 37 (60.7%) fair and only 8 (13.1%) very good.

In Group C no complication was encountered. Seven scars (10.9%) were considered ugly, 21 (32.8%) fair and 37 (57.8%) very good.

In Group D wound infection was encountered in one patient (1.7%). Three scars (5%) were judged as ugly, 40 (66.7) as fair and 16 (26.7%) as very good.

The best results were achieved in Group E. Apart from the fact that no complications were encountered, none of the scars was considered ugly, 16 (24.3%) fair and the majority (50/66, 75.8%) very good.

To summarize these results: the worst outcome and the highest complication rate were

**Table 1:** Outcome of the Various Techniques Using Different Suture Material

Group	Very Good		Fair		Unsatisfactory	
	No	%	No	%	No	%
A	3	4.8%	13	20.6%	47	74.6%
B	8	13.1%	37	60.7%	16	26.2%
C	37	57.8%	21	32.8%	7	10.9%
D	16	26.7%	40	66.7%	3	5.0%
E	50	75.8%	16	24.3%	-	-
Total	114/314	36.3%	127/314	40.4%	73/314	23.3%

**Table 2:** Complications Encountered

Group	Wound Infection	Stitch Abscess	Stitch Granuloma
A	3	5	2
B	1	-	-
C	-	-	-
D	1	-	-
E	-	-	-

found with silk interrupted mattress sutures, while the best outcomes were achieved with nylon subcuticular continuous running sutures followed by chromic catgut subcuticular continuous running sutures. (Tables 1, 2)

## DISCUSSION

The surgical scar occupies an important position in surgical practice. To the eyes of the untrained, it is the mirror through which the overall success of a surgical operation is assessed and several studies<sup>13-16</sup> have been devoted to ways of improving the surgical scar. This has ranged from improvements in suture materials<sup>17</sup>, techniques<sup>17-19</sup> of closure as well as placement<sup>20</sup> of surgical incisions. Nevertheless, there is still some controversy as to the best material or technique that applies to all surgical wounds<sup>21</sup>. Most of the studies have come from the developed world because of the medico-legal controversies<sup>22,23</sup> generated by ugly scars. In our environment, the medico-legal awareness of ugly scars is low because

of poverty and underdevelopment. However, with increasing development, especially with the introduction of the National Health Insurance Scheme in Nigeria, we believe that litigation may arise from ugly scars in future.

This study, therefore, looks at the exogenous factors that may affect our surgical scars within our limits of operation. Our experience is discussed here with an extensive review of the literature.

Our study sample and design is in agreement with other studies<sup>19,24</sup> found in the literature. Our choice of groin crease incision in order to eliminate incision site bias is also in conformity with the work of Switzer et al<sup>25</sup>. However our follow-up period was longer than that of most other studies<sup>26-28</sup> because we wanted to give the scar time to mature. At the same time this gave us an opportunity to observe our recurrence rate (though not part of the present study) in the repair of groin hernias in children.

Our assessment of the scar when compared with the assessment used by the other authors quoted cannot be said to be as fool-proof as theirs. While most authors were assisted by a dermatologist or plastic surgeon for judging the quality of the scar, this was not possible in our case. At our institution we have only one consultant dermatologist and one consultant plastic surgeon, both on part-time appointment, and their consultation hours do not coincide with ours. In our study, assessment was based on the patients'/parents' assessment, our own assessment and the assessment of a senior registrar who was blinded to the study. When we compared the judgment

of all these, there was no significant difference in opinion.

When comparing our results to those of others two important exogenous factors - types of suture material<sup>19,29,30</sup> and suture technique<sup>17,21</sup> - were found to greatly influence the type of scar. Our results show that for any particular suture material subcuticular continuous running stitches produce a better scar than interrupted mattress sutures which again agrees with the work of Lindholt et al<sup>13</sup>. As for the individual sutures compared in our series, nylon offers the best scar in all techniques and offers the best result when used in a running continuous subcuticular fashion. Our experience (though not part of this study) shows that removal of a subcuticular suture in children is easier than removal of interrupted mattress sutures.

We therefore conclude that in a developing country where sutures are to be used for closure of groin skin incisions in children, nylon should be used in a continuous running subcuticular fashion because it offers the best cosmetic result. Wherever available, 5/0 nylon sutures used with a cutting needle in a subcuticular fashion should be the material of choice. The ease of removal is an added advantage. A call is also made for a similar study for other skin incisions.

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## RESUME

### La fermeture de la peau après la réparation de l'hernie de l'aîne chez les enfants : une étude comparative de trois matériaux de suture et de deux techniques de suture

**Objectif** La cicatrice chirurgicale est de grande importance au patient et au chirurgien. Pour le patient une cicatrice laide peut non seulement présenter un problème esthétique mais dans certains cas peut également altérer la fonction, et le chirurgien est toujours confronté au problème du litige possible. Cette étude a été entreprise pour évaluer l'effet des matériaux de suture et des techniques de suture de peau sur les cicatrices chirurgicales. **Patients et méthodes** Trois matériaux de suture (le catgut chromique 3/0, la soie 3/0 et le nylon 3/0) et deux techniques de fermeture de peau (les points séparés transcutanés et les sutures par surjet intradermique) ont été comparés dans une étude partiellement aveugle randomisée. Les cicatrices résultantes ont été évaluées après deux ans en utilisant une échelle à trois niveaux. **Résultats** La suture au nylon en intradermique a donné les meilleurs résultats esthétiques suivis du catgut chromique en intradermique. Les sutures en soie par points séparés transcutanées ont laissé les plus mauvaises cicatrices suivies des sutures en soie par surjet intradermique. **Conclusion** L'utilisation des matériaux de suture pour la fermeture de peau est toujours la norme dans les pays en voie de développement. Nous proposons donc que pour n'importe quel matériel particulier de suture, la technique de surjet intradermique devrait être employée et autant que possible le matériel de suture de choix devrait être du nylon.

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