



Comparison of suture material and technique of closure of subcutaneous fat and skin in caesarean section

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Abstract

Background: Throughout the world a large number of women undergo caesarean section. These women pass through a period of post operative morbidity and pain for a period. After caesarean section use of the appropriate technique to approximate the wound would avoid financial load and would also help in early recovery of patient.

Aim: Aim of this study was to compare the effects of alternative techniques for closure of skin and subcutaneous fat over the maternal health and use of healthcare resources in the caesarean section.

Materials and Methods: Patients undergoing Caesarean section were divided in two groups of 50 patients each. Patients with hematological disorders or a diabetes, septicemia, malignancy, or chorioamnionitis were altogether excluded from the study. In all patients, after stitching the uterus, the rectus sheath was stitched with the thread vicryl No.1 (synthetic absorbable sutures formed of polyglycolic acid, polycaprolactone with calcium stearate coating), using round body needle. Patients were then divided into two groups. In group I, vicryl No.1 thread used in stitching the rectus sheath was continued into skin with application of the subcuticular stitches, after securing the edges with knot. Whereas in group II, after the rectus sheath was stitched with vicryl No. 1, the thread was cut. Then interrupted sutures were applied onto subcutaneous fat with thread vicryl No. 2. Skin was then stitched by subcuticular stitches using proline no. 2, a non-absorbable non braided propylene suture. The two groups of patients were then observed for various parameters like the duration of surgery, post-operative pain in the stitches, patient's satisfaction about the removal of stitches, seroma or evidence of wound infection and cosmetic results.

Results: It was noted that the total duration of surgery in group I was average 7.3 minutes lesser as compared to that of duration in group II. Patients in group I were much more satisfied with the results of the surgery and were relieved to know that their stitches were absorbable.

Conclusion: Although no difference was found in the rates of formation of scar tissue and wound infection between the group I and group II, the duration of surgery was lesser and the patients were much more satisfied in group I.

INTRODUCTION

Various goals of wound closure include even distribution of tension along deep suture lines, obliteration of dead space and maintenance of tensile strength across the wound. It is needed to achieve adequate tissue tensile strength. Various methods employed for the mechanical wound closure include tape, adhesives, staples, and sutures. Each method has specific advantages / disadvantages and specific indications, Suture closure leads to primary wound healing as tissue is held in the proximity until enough healing has already occurred to withstand stress without any mechanical support. Suture material is a foreign body implanted in human tissue, it elicits a foreign body tissue reaction. During the wound closure, a field sterility and a meticulous aseptic methodology are very critical to minimize the risk of wound infection. Complications of wound healing such as wide scars, hypertrophic scars and wound dehiscence can also result from patient factors, such as nutritional status, an incorrect suture selection or technique which causes excessive tension across wound. Monofilament sutures are made of single strand, a structure that is relatively much more resistant to harboring various micro-organisms. The monofilament sutures experience much lesser resistance to the passage through tissue than that of multifilament sutures. Great care must be undertaken in handling and tying of a monofilament suture because crimping or crushing can weaken or nick the sutures which lead to premature suture failure. A multifilament suture is composed of several filaments which are twisted or braided together. Although this material is less stiffer, it has a much higher coefficient of friction. Whereas multifilament sutures generally have greater tensile strength, better flexibility and pliability than that of monofilament sutures. This type of suture ties very well. Since multifilament materials have much more capillarity, this increases absorption of fluid and may act as a tract for the introduction of various pathogens.

Caesarean section is very commonly performed abdominal operations of women in the world. Its rate of caesarian section has markedly increased in recent years, and is now about 20–25% of all child-births in most of developed countries [1, 2]. The rates in other areas in the world vary widely, from 1.6% of all child-births in Haiti to whopping 59% in Chilean private hospitals [3]. Various surgical techniques for all the elements of the caesarean section operation are in use [4]. Many of these techniques have not yet been rigorously evaluated in various trials, and it is not known whether or not they are associated with better outcomes. There is not enough evidence at present to say whether any particular technique is better than the others for closing the abdominal wall during caesarean section [5].

Materials and Methods

This study was conducted on one hundred patients undergoing primary caesarean section. These patients were divided into two equal groups. Only those patients who had transverse incision during elective or emergency caesarean section were included in our study. Patients with established and/or gestational diabetes, hemodynamic instability, coagulation defects, chorioamnionitis or septicemia were excluded. Patients on anticoagulants or cytotoxic drugs and those with malignancy or hematological disorders were also excluded from our study. Written and well informed consent was taken from all patients.

In the group I, after stitching uterus, the rectus sheath was stitched with vicryl No.1 on a round body needle. Securing the edges with knot, the thread of the rectus sheath was continued into skin with application of the subcuticular stitches. In the group II, after stitching the rectus sheath with thread vicryl No. 1. The thread was cut and then interrupted sutures were applied into subcutaneous fat with thread vicryl 2/0. Skin was then stitched by subcuticular stitches with monobraided proline 2/0. Prophylactic antibiotics were also given for 24 hours. All surgeries were performed by consultants or under their guidance in the teaching hospital. Round body needles were only used in these surgeries.

Dressing of all patients was opened on the second post-operative day. Patients in group I did not at all require removal of stitches. Stitches of patients in group II were removed altogether or in stages between 8th and 12th post operative days. Both the groups of cases were observed then for the duration of surgery. Both groups were then followed up for post operative pain in the stitches, evidence of wound seroma or infection, patient's satisfaction about removal of stitches and cosmetic results. The data was collected in the Operation Theater

immediately after the surgery/ at discharge from the hospital/ at first post-natal visit/ and at six weeks after the delivery., Visual Analogue Scale (VAS) was used with a 10 cm line labeled at '0' with 'no pain' while '10' with 'worst pain' to allow comparable assessment of pain.

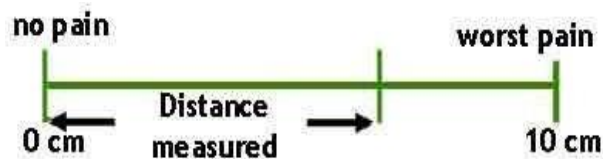


Fig. 1 Visual analogue scale is used to assess post-operative pain.

Results

Table 1 depicts the average duration of the surgery. It was noted that the duration of surgery in group I on the average was 7.3 minutes lesser as compared to that of patients in group II. Degree of pain was assessed with the help of Visual Analogue Scale (VAS) which depicted significant pain as more than that of 5/10. The data was then analyzed by the SPSS software. P value was calculated less than 0.05. Data was then presented as percentages and proportion. Pain was significantly lesser in group I (Table 2)

Table 1 Duration of surgery

Duration (minutes)	Group I =50	Group II =50	Difference
< 30 min	33	17	335
30-45 min	14	31	-336
>45 min	3	2	-1
Overall average duration	31.5	39	-7.3min

Table 2 Post operative pain in Visual Analogue Scale

	Group I	Group II	P Value
First post operative day	44	42	0.890
Second post natal week	20	37	< 0.001

Patients in that of group I were much more satisfied with the results of surgery; and they were highly relieved to know that their stitches did not actually need to be removed. None of the patients in either group had morbid wound infection. Few cases of seroma and superficial wound infection were found in both groups which was not a serious affair. They did not require any treatment except to that of a few dressings. Cosmetic results in both the groups were equally good.

Discussion

Absorbable sutures provide a temporary wound support, until wound heals well enough so that it withstands the normal stress. The absorbable surgical sutures are made from either synthetic polymers or "natural" polymers. Natural polymers include surgical gut / chromic and collagen. Their absorption occurs by natural enzymatic degradation. Synthetic sutures are the chemical polymers absorbed by the hydrolysis and cause much lesser degree of tissue reaction following placement. These sutures include Vicryl (Polyglactin 910), Monocryl: (Poliglecaprone 25), Polydioxanone and Polysorb.

The first stage of the absorption has a linear rate lasting upto weeks. The second stage is then characterized by a loss of suture mass and this stage actually overlaps the first stage. The loss of the suture mass occurs as a result of the leukocytic cellular responses that remove all cellular debris and suture material from the line of the tissue approximation. Chemical treatments of surgical gut such as chromic salts lengthen the absorption

time. Accelerated absorption may occur in patients with infection, fever, or protein deficiency and may then lead to excessively rapid decline in the tensile strength. Accelerated absorption may occur in a body cavity, filled with fluid, that is moist, or if the sutures become moist or wet during handling prior to implantation.

Non-absorbable sutures further elicit a tissue reaction that results in an encapsulation of the suture material by the fibroblasts. Non-absorbable sutures are natural (eg. surgical silk) or synthetic (eg. Prolene, nylon, Polypropylene). Prolene is a monofilament suture, is a linear propylene polymer. It permits no or little saturation. The material does not adhere to the tissue and is much useful as a pull-out suture (subcuticular closure). Polypropylene holds the knot better than all other monofilament synthetic material. This material elicits minimal tissue reaction and is biologically inert. Prolene is not subject to weakening or degradation and maintains similar tensile strength for up to two years. This material is useful in the contaminated and infected wounds, minimizing the suture extrusion and chances of sinus formation. Suture selection depends on the surgeon's preference and training. A wide variety of suture materials are available for each surgical requirement and surgical location. The tensile strength of the suture material should never actually exceed the tensile strength of that of tissue. As the wound starts healing, the relative loss of suture strength over time should be much slower than that of gain of tissue tensile strength. Aesthetic concerns are unequivocal in women. Sutures are needed no longer when a wound has reached its maximum strength. Therefore, non-absorbable sutures are considered in fascia, tendons and skin (slowly healing tissues). While mucosal wounds (i.e. rapidly healing tissues) may be closed with absorbable sutures. Wound healing and closure and is affected by the initial tissue injury caused by and subsequent suture passage and needle penetration. Surface characteristics of the suture (e.g. coefficient of friction), needle selection and suture coating materials are important factors that should be considered by the surgeon.

Ideal surgical needle characteristics include smallest possible diameter, stability in the grasp of needle holder, high-quality stainless steel, sharpness enough to penetrate tissue with minimal resistance, capability of implanting suture material through tissue with minimal trauma, sterile and corrosion-resistance to further prevent introduction of microorganisms/ foreign materials into the wound. Round needle passes and penetrates through tissues by stretching without cutting. A sharp tip at the point flattens to an rectangular /oval shape. Curved needle also has a predictable path through the tissue and requires lesser space for maneuvering than that of a straight needle. The semicircular path is optimal course for the sutures through tissues. It provides an even distribution of the tension. The main consideration in the needle selection is for minimizing trauma. A round tip needle is sufficient for the tissues that are easy to penetrate. The ideal suture should be cause no tissue reaction and is biologically inert. It must be easy for surgeon to handle the sutures and also knot it reliably. It should neither promote nor cause complications. There have been great improvements in suture materials in recent past. Modern sutures are very close to above ideal yet no single suture is actually ideal in all situations. Different tissues exhibit different requirements for suture support. While some need only a few days of the support such as skin, subcutaneous tissue, and muscle. Others require weeks and even months such as fascias and tendons. Healing of wounds is delayed by a range of factors such as debility, infection, respiratory problems, collagen disorders, obesity, malnutrition, drugs such as cytotoxics and steroids, malignancy etc. Subjective preferences such as availability and familiarity with the material should also to be taken into the account. It could be said that it is always better to use absorbable suture unless there is a reason not to use it. When used for skin closure, the non-absorbable sutures must be removed as they will further lead to chronic sepsis.

Caesarean section is a very common operation with no agreed standards on materials to use and operative techniques. There is no conclusive evidence in very studies about how the skin should be closed after caesarean section. The appearance and strength of scar following caesarean section is utmost important to women. There is not enough evidence at present to say whether any particular technique for closing the abdominal wall during a caesarean section is better than that of the others [5]. The subcutaneous fat (which is between the sheath and the skin) may be left to heal without suturing or it can be closed using a variety of techniques. Closing the subcutaneous fat reduces the risk of some wound complications (i.e. haematoma and seroma) but further research is again needed to investigate how these outcomes affect the wellbeing and the recovery of the patient concerned [5].

The aim of this study was to examine 2 specific aspects of techniques used in caesarean section to help determine which method can lead to a better outcome for the women and also health care resources. It was a randomized study making comparison of (1) suture used for closure of the subcutaneous fat versus none, and (2) suture materials used for closure of skin.

The risk of hematoma or seroma was much reduced with fat closure as compared with that of non closure. In the risk of wound infection no difference was found [5]. There was no case of maternal infection or death or morbidity in any of the group. Patients were then observed for six weeks after delivery. It is important that caesarean sections are performed as effectively and safely as possible.

Conclusions

The best way of how to close mother's skin after caesarean section is not well known. Given the very high number of caesarean sections performed in developing countries, even small differences shall be important for the population's health and cost of health services.

There is wide variation all over world in the surgical techniques used for caesarean sections. There is therefore need for future research to evaluate aspects of caesarean sections on substantive short and long term outcomes [4].

References

1. Menacker F, Curtin SC. Trends in cesarean birth and vaginal birth after previous cesarean, 1991-99. *Natl Vital Stat Rep* 2001; 49(13):1-16.
2. Thomas J, Paranjothy S. The National Sentinel Caesarean Section Audit report. London: Royal College of Obstetricians and Gynecologists, 2001.
3. Belizan J, Althabe F, Barros F, Alexander S. Rates and implication of cesarean sections in Latin America: ecological study. *BMJ* 1999; 319:1397-1402.
4. Tully L, Gates S, Brocklehurst P, Ayers S, McKenzie-McHarg K. Surgical techniques used in caesarean section operations in the UK: a survey of current practice. *Eur J Obstet Gynecol Reprod Biol* 2002; 102: 120-126.
5. Anderson ER, Gates S. Techniques and materials for closure of the abdominal wall in caesarean section. *Cochrane Database of Systematic Reviews* 2004; 4: CD004663.
6. Croce P, Frigoli A, Perotti D, Di Mario M. Cesarean section, techniques and skin suture materials. *Minerva Gynecol*, 2007; 59 (6):595-599.