

ORIGINAL ARTICLE

Comparison of Wound Infection with Absorbable Suture Versus Non-Absorbable Suture after Cesarean SectionMARIA SIDDIQUI¹, SYEDA SAHAR ZAHRA², SYEDA TASKEEN EJAZ³, BAZGHA SAHAR⁴, NABILA EAJAZ⁵, SAIMA RAEES AHMAD⁶¹Deputy Medical Superintendent, Nisthar Hospital, Multan.²Assistant Professor, Department of Obstetrics & Gynecology, Bahawalpur Medical and Dental College and Hospital, Bahawalpur, Pakistan.³Department of Obstetrics & Gynecology, DGK Medical College and teaching hospital, Dera Ghazi Khan.⁴Consultant Gynecologist, Department of Obstetrics & Gynecology, Buch International Hospital, Multan⁵Women Medical Officer, Shahbaz Shareef Hospital, Multan.⁶Consultant Gynaecology, Department of Obstetrics & Gynaecology, Buch International Hospital, Multan.Correspondence to: Syeda Sahar Zahra, Email: syedasahar108@yahoo.com, Cell: +92 336 6045352**ABSTRACT****Objective:** To compare the frequency of wound infection with absorbable suture and non-absorbable suture after cesarean section.**Study Design:** A randomized controlled trial.**Place and Duration:** Department of Obstetrics and Gynaecology, Nisthar Hospital, Multan from August 2021 to June 2022.**Methodology:** A total of 826 women (413 in each group) undergoing cesarean section were included. In Group-A absorbable suture was employed while in Group-B, non-absorbable suture was used. Post-operatively, all patients were followed up weekly and the final assessment of wound infection was done after 15 days.**Results:** In a total of 826 cases, mean age was 26.47±3.42 years. Mean body mass index was 25.62±1.87 kg/m² and obesity was present in 166 (20.1%). Of these 826 study cases, emergency cesarean section was performed in 593 (71.8%). Mean duration of procedure was 38.43±12.21 minutes and 562 (68.0%) had duration of procedure below 40 minutes. Overall, wound infection was noted in 145 (17.6%) women, In Group-A, wound infection was noted in 96 (23.2%) women and in Group-B it was in 49 (11.9%) (p<0.0001).**Practical Implications:** Clinicians can employ non-absorbable sutures to decrease the risk of post-operative wound infection after cesarean section.**Conclusion:** We found non-absorbable sutures after cesarean section to yield significantly less rates of wound infection when compared to absorbable sutures.**Keywords:** Absorbable suture, Non-absorbable suture, wound infection, cesarean section.**INTRODUCTION**

The purposes of closing a wound are to obliterate the dead space, to distribute uniform tension across deep suture lines, and to keep up tensile strength through the wound.¹ Once the epithelial parts of the tissues are drawn together and everted, it is needed to acquire sufficient tensile strength across the wound. Multiple techniques like tape, staples, adhesives, and sutures are used for wound closure.² There are specific indications for the employment of each technique while benefits and drawbacks are also associated with these techniques. Sutures hold the tissues proximally, allowing healing by first intention, so that sufficient healing could be achieved to bear the stress without providing some other assistance. As the material of implanted suture is a foreign body for the human tissue, body tissue brings about reaction. It is very important to sterilize the area effectively and adopt a meticulous aseptic technique to prevent the chances of wound getting infected in the course of wound closure. During the healing process, some of the factors like dietary habits, implantation of an improper suture or a method which provides unnecessary tension across the tissues of the wound may occur.³

For the satisfaction of the patients, going through cesarean section followed by the process of wound healing, it is very important to minimize the rates of complications. According to a survey conducted by Tully et al, in order to close skin, obstetricians preferred subcuticular sutures were 73.9%, moreover, 41.1% used Prolene, Vicryl 17.5%, Dexon 13.5% and staples 10.4%.⁴ Cosmetically improved outcome, better rates of the patient satisfaction and better healing of wound, despite some variation in the results, have been found with the use of subcuticular sutures.^{5,6}

Globally, cesarean section is one of the most frequently performed interventions. For the past few years, the rates of cesarean section have been significantly rising, even in highly developed countries, rates of cesarean delivery is between 20-25%.⁷ A study conducted by Pinar Solmaz Hasdemir et al, has revealed that among patients undergoing cesarean section, 22.5% developed wound infection in absorbable suture group in comparison to 14.9% and in nonabsorbable suture group.⁸

To the best of our knowledge, no real data exists regarding comparison of absorbable and non-absorbable sutures with regards to post cesarean delivery wound infection. After an extensive exploration of the relevant literature on the web, only one Turkish study regarding this issue was found, so as far as other populations are concerned it is not possible to generalize its findings at present. This study was planned to compare the frequency of wound infection with absorbable suture and non-absorbable suture after cesarean section. The findings of this study was thought to help us get local evidence on this topic in our population. We hypothesized that there is a difference in the frequency of wound infection with absorbable suture and non-absorbable suture after cesarean section.

METHODOLOGY

This randomized controlled trial was conducted at the department of Obstetrics and Gynaecology, Nisthar Hospital, Multan from August 2021 to June 2022. Sample size of 826 (413 in each group) was calculated with confidence level= 95% and alpha= 7.5% (two-sided) with power = 80%. By using expected proportion (wound infection) in population 1 = 22.5%.⁸ and least expected proportion(wound infection) in population 2 = 14.9%.⁸ Total sample size was divided into two groups, 413 in Group A or absorbable suture group while 413 for Group B or non-absorbable suture group. Approval from "Institutional Ethics Committee" was acquired. Written and informed consents were also sought.

Inclusion criteria were women aged 20-35 years having singleton pregnancy on ultrasound with gestational age between 37-42 weeks, and undergoing caesarean section delivery (either elective or emergency) with parity between 0-4. Women with past history of cesarean section, anemia, history of placenta previa on ultrasound, diabetes mellitus or hypertension were excluded.

At study entry baseline, demographic data (age, parity, gestational age) was recorded. The subjects were randomly assigned by online computer generated random list into one of two groups of 413 patients each. Women in Group- A were employed absorbable suture while Group-B women were employed non-absorbable suture. All the caesarean sections were done by

experienced gynecologists of 3 year post-fellowship experience and well versed with cesarean section procedures. Skin of the patients was cleaned with povidone iodine 3-4 minutes before the operation started. Prophylactic antibiotic (2nd generation cephalosporin) was administered in all patients right after cord clamping. The same operation technique (Pfannenstiel Incisional technique) was used for all patients. Subcutaneous tissues were closed with interrupted sutures. Polyglactin-910 (3.0 Vicryl) was used as absorbable and polypropylene (3.0 Prolen) was used as non-absorbable suture material for skin closure. Continuous suturing with curved needle was used in all patients regardless of the suture type. Cesarean section site was cleaned with iodine solution and covered with sterile gauze and adhesive tape. Non-absorbable suture materials was removed post-operatively between 7-10 days. Post-operatively, all patients were followed up weekly and the final assessment of wound infection was done after 15 days in both groups. Wound infection was defined as an infection that occurs at the site of the incision with redness and pain (VAS score >4) around the area and drainage of cloudy fluid from surgical wound (presence of all) on physical examination after 15 days of caesarean section. Obesity was defined as if her BMI is more than 27.5 kg/m².

Data was analyzed with statistical analysis program "Statistical Package for Social Sciences (SPSS)", version 26.0. Frequency and percentage was computed for qualitative variables like monthly family income, elective cesarean section, emergency cesarean section and wound infection. Mean \pm standard deviation (SD) was calculated for quantitative variables like age, gestational age, parity, duration of procedure, weight, height and BMI. Chi-square test was applied to compare both groups and outcome (wound infection) with respect to study variables, taking $p \leq 0.05$ as statistically significant.

RESULTS

In a total of patients, the mean age was 26.47 \pm 3.42 years (ranging 22-35 years). The mean parity was 2.26 \pm 1.31. Emergency cesarean section was performed in 593 (71.8%) while elective cesarean section was performed in 233 (28.2%). Mean duration of procedure was 38.43 \pm 12.21 minutes and 562 (68.0%) had duration of procedure up to 40 minutes. Table-1 is showing comparison of demographical and clinical characteristics among both study groups.

Table-1: Comparison of Demographics and Clinical Characteristics (N=826)

| Characteristics | | Group-A (n=413) | Group-B (n=413) | P-Value |
|----------------------------|------------------|-----------------|-----------------|---------|
| Age Groups | 20-30 | 348 (84.3%) | 344 (83.3%) | 0.7058 |
| | 31-35 | 65 (15.7%) | 69 (16.7%) | |
| Residential Status | Rural | 132 (32.0%) | 134 (32.4%) | 0.8816 |
| | Urban | 281 (68.0%) | 279 (67.6%) | |
| Poor Socio-Economic Status | | 132 (32.0%) | 134 (32.4%) | 0.8816 |
| Obesity | | 82 (19.9%) | 84 (20.3%) | 0.8621 |
| Parity Status | Up to 2 | 249 (60.3%) | 246 (59.6%) | 0.8313 |
| | >2 | 164 (39.7%) | 167 (40.4%) | |
| Gestational Age | Up to 40 weeks | 331 (80.1%) | 326 (78.9%) | 0.6662 |
| | > 40 weeks | 82 (19.9%) | 87 (21.1%) | |
| Types of Cesarean Delivery | Emergency | 298 (72.2%) | 295 (71.4%) | 0.8166 |
| | Elective | 115 (27.8%) | 118 (28.6%) | |
| Procedure Time | Up to 40 minutes | 281 (68.0%) | 281 (68.0) | 1 |
| | > 40 minutes | 132 (32.0%) | 132 (32.0%) | |

Group-A: Absorbable Suture; Group-B: Non-absorbable Suture

Of these 826 study cases, wound infection was noted in 145 (17.6%). In Group-A, wound infection was noted in 96 (23.2%) and in Group-B, 49 (11.9%) women had wound infection ($p < 0.0001$) as shown in table-2.

Table-2: Comparison of Wound Infection (N=826)

| Wound Infection | Group-A (n=413) | Group-B (n=413) | P-Value |
|-----------------|-----------------|-----------------|---------|
| Yes | 96 (23.2%) | 49 (11.9%) | <0.0001 |
| No | 317 (76.9%) | 364 (88.1%) | |

Group-A: Absorbable Suture; Group-B: Non-absorbable Suture

DISCUSSION

The most frequently observed complication followed by a surgical intervention is still considered to be infection all over the world, so it creates a need for the implementation of surgical site infection (SSI) surveillance going through surgical procedures in order to achieve standardized incidence ratio (SIR).^{9,10} While taking the safety measures to avoid wound infections, there should be early implementation of the top quality services to the patient. Currently, cesarean is not only the commonest surgical procedure, but in many countries its frequency has risen in recent decades.^{11,12}

Reports have shown that the wound infection prevalence and disruption followed by cesarean has been ranging between 2-42%.^{13,14} Post-surgical morbidity like wound infection not only disturbs quality of life of the affected patients but it also delays recovery and prolongs duration of hospitalization. In recent times, decreased bacterial susceptibility against antimicrobial drugs has added to the substantial rise in the cost of medical treatment. Post-cesarean wound infection also increases the cost of treatment as broad spectrum antibiotics become need of the time. In the course of wound healing following cesarean section, the use of antibiotics through oral route is preferred as compared to topical applications.^{15,16}

We found that mean age was 26.47 \pm 3.42 years (ranging between 22-35 years) while 83.8% patients were aged < 30 years. Jama et al¹⁷ conducted a study and described that the mean age of the females who developed wound infection followed by cesarean section was 31 \pm 3.4 years which is similar to our findings. Another report done by Nikpour et al found mean age of their study participants to be 27.70 \pm 4.97 years.¹⁴ Studying frequency of the wound infection followed by cesarean section, Jido et al¹⁸ found that the patients aged between 26 to 35 years had significant linkage with wound infection which is quite similar to what we noted as we also had observed a significant association of age below 30 years with wound infection.

In this study, mean BMI of the individuals was 25.62 \pm 1.87 kg/m² and 20.1% of the cases were obese. A comparatively lower percentage (8.5%) of obese patients was recorded by Dhar et al.¹⁰ Obesity percentage described by Jama et al¹⁷ among the patients was 25.2% which is similar to our study results. We noted that among the total study cases, 2.26 \pm 1.31 was the mean parity and 59.9% of the patients had parity up to 2.

The patients who underwent emergency cesarean procedures were 71.8%. The results of a study performed by Mitt et al¹⁹ did not match to the results as they observed that patients who had gone through emergency cesarean section, 74% developed wound infection. Among total enrolled cases, in 17.6% of the cases developed wound infection, 23.2% contributed from absorbable suture groups and 11.9% from non-absorbable suture group ($p < 0.0001$). Hasdemir PS et al had found similar findings in their study where they noted that using absorbable suture the wound infection frequency was 22.5% and 14.9% wound infection cases were observed when nonabsorbable suture were used following cesarean.⁸ These results are in accordance with our results.

Good sample size and prospective nature of the study are some of the major strengths of this study. Being a single center study, our findings cannot be generalized and should further be verified in the future trials.

CONCLUSION

Non-absorbable sutures yielded significantly less rates of wound infection following cesarean section in comparison to absorbable sutures. Clinicians can employ non-absorbable sutures to decrease the risk of post-operative wound infection after cesarean section.

REFERENCES

1. Khiste SV, Ranganath V, Nichani AS. Evaluation of tensile strength of surgical synthetic absorbable suture materials: an in vitro study. J Periodontal Implant Sci. 2013;43(3):130-5.

2. Al-Mubarak L, Al-Haddab M. Cutaneous wound closure materials: an overview and update. *J Cutan Aesthet Surg*. 2013;6(4):178–88.
3. Islam A, Ehsan A. Comparison of suture material and technique of closure of subcutaneous fat and skin in caesarean section. *N Am J Med Sci*. 2011;3(2):85–88.
4. Tully L, Gates S, Brocklehurst P, McKenzie-McHarg K, Ayers S. Surgical techniques used during caesarean section operations: results of a national survey of practice in the UK. *Eur J Obstet Gynecol Reprod Biol*. 2002;102(2):120-6.
5. Gizzo S, Andrisani A, Noventa M. Caesarean section: could different transverse abdominal incision techniques influence postpartum pain and subsequent quality of life? a systematic review. *PLoS One*. 2015;10(2):e0114190.
6. Chen D, Song J, Zhao Y, Zheng X, Yu A. Systematic review and meta-analysis of surgical zipper technique versus intracutaneous sutures for the closing of surgical incision. *PLoS ONE*. 2016;11(9):e0162471.
7. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. *PLoS One*. 2016;11(2):e0148343.
8. Hasdemir PS, Guvenal T, Ozcakir HT. Comparison of subcuticular suture materials in cesarean skin closure. *Surg Res Pract*. 2015;2015:141203.
9. Gould D. Caesarean section, surgical site infection and wound management. *Nurs Stand*. 2007 Apr 18-24;21(32):57-8.
10. Dhar H, Al-Busaidi I, Rathi B, Nimre EA, Sachdeva V, Hamdi I. A study of post-caesarean section wound infections in a regional referral hospital, Oman. *Sultan Qaboos Univ Med J*. 2014 May;14(2):211-7.
11. Miseljic N, Ibrahimovic S. Health implications of increased cesarean section rates. *Mater Sociomed*. 2020;32(2):123-126.
12. Ali Y, Khan MW, Mumtaz U, Salman A, Muhammad N, Sabir M. Identification of factors influencing the rise of cesarean sections rates in Pakistan, using MCDM. *Int J Health Care Qual Assur*. 2018;31(8):1058-1069.
13. Mousavi SA, Mortazavi F, Chaman R, Khosravi A. Quality of life after cesarean and vaginal delivery. *Oman Med J* 2013. Jul;28(4):245-251
14. Nikpour M, Shirvani MA, Azadbakht M, Zanjani R, Mousavi E. The effect of honey gel on abdominal wound healing in cesarean section: a triple blind randomized clinical trial. *Oman Med J*. 2014 Jul;29(4):255-259.
15. Suarez-Easton S, Zafran N, Garmi G, Salim R. Postcesarean wound infection: prevalence, impact, prevention, and management challenges. *Int J Womens Health*. 2017;9:81-88.
16. Kawakita T, Landy HJ. Surgical site infections after cesarean delivery: epidemiology, prevention and treatment. *Matern Health Neonatol Perinatol*. 2017;3:12.
17. Al-Jama FE. Risk factors for wound infection after lower segment cesarean section. *Qatar Med J*. 2012;2012(2):26–31.
18. Jido TA, Garba ID. Surgical-site Infection Following Cesarean Section in Kano, Nigeria. *Ann Med Health Sci Res*. 2012 Jan-Jun;2(1):33–6.
19. Mitt P, Lang K, Peri A, Maimets M. Surgical site infections following cesarean section in an Estonian University Hospital: post discharge surveillance and analysis of risk factors. *Infect Control Hosp Epidemiol*. 2005;26:449-54.