

Received: 24 February 2014 • Accepted: 08 March 2014

Research

Comparison of the Outcomes of Traditional and Misgav-Ladach Techniques in Caesarean Section

Anisodowleh Nankali^{1*}, Farin Farajzadeh², Mansour Rezaei³, Shohreh Malekkhosravi⁴, Sara Daeichin⁵¹ Assistant professor. Maternity Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran² Kermanshah University of Medical Sciences, Kermanshah, Iran³ Biostatistics department, Kermanshah University of Medical Sciences, Kermanshah, Iran⁴ High risks pregnancy Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran⁵ Maternity Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran*correspondence should be addressed to Anisodowleh Nankali, Assistant professor. Maternity Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran; High risks pregnancy Research center, Imam Reza Hospital, Parastar Blvd, Kermanshah, Iran; Tell: +989181314921; Fax: +98; Email: anis_nankali@yahoo.com.

ABSTRACT

Caesarean section is the most common surgical procedure in obstetrics, and its application is rising in the entire world. The aim of the present study was to compare the outcomes of traditional and Misgav-Ladach techniques in caesarean section. This randomized clinical trial study was conducted on 186 cases of primary elective and emergency C-Section over 37 weeks of gestation in Imam Reza Hospital in 2010. The pregnant women were randomized into two groups: 1. traditional 2. Misgav-Ladach. Both groups were similar in terms of age and BMI. The major outcomes were studied duration of surgery, such as fetal extrusion time, blood loss during surgery, need for blood transfusion and analgesics, duration of bowel function restoration, persistent fever after surgery, use of antibiotics, endometritis and wound complications. Kolmogorov-Smirnov (KS) test was used to evaluation of the normality of quantitative data. Variables with normal distribution were analyzed by using parametric test (independent t-test) and Variables with non-normal distribution were analyzed by using non-parametric (Mann-Whitney - U test). Chi-square and Fisher's test were used to determine the relationship between qualitative variables. The Misgav-Ladach group had significantly smaller duration of surgery, fetal extrusion time, antibiotics use, and length of hospital stay after surgery compared to the traditional group. This study showed that Misgav-Ladach technique can be used as a substitute for traditional methods in cases of elective or emergency C-Section.

Key words: Misgav-Ladach technique, traditional technique, Cesarean

Copyright © 2014 Anisodowleh Nankali et al. This is an open access article distributed under the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/).

1. INTRODUCTION

Caesarean section is the most common surgical procedure in obstetrics, and its application is rising in the entire world (1). Although François Mauriceau was the first to introduce c-section in the seventeenth century, the greatest breakthrough in caesarean technique occurred in the late nineteenth century, when suturing the uterine wall led to ascertained decrease in mortality of C-Section (2). In 1987, Pfannenstiel introduced the transverse incision of abdominal wall in the suprapubic region (3). In 1926, Kerr described the transverse incision of the inferior segment of Uterus which included a double-layer suturing of uterine wall and repairing peritoneum (4). The Pfannenstiel incision is a transverse incision above symphysis pubis and curves upwards (5). Nevertheless, despite the universal acceptance, certain limitations of this technique lead to modify of obstetric surgeries by some pioneers (5). The advantages of transverse incision include best of concinnity outcome and less risk of incisional hernia (6, 7). In 1972, Joel-Cohen introduced a new method to opening the abdominal wall, covering of

a transverse incision on the skin, about 5 cm above the symphysis pubis (above the Pfannenstiel incision) and blunt dissection of the abdominal wall (8). In late 1980s and 1993, Suturing of one layer of the uterus and leaving the peritoneum unrepaired were recommended (9, 10). Stark was the first to evaluate these three surgical modifications in 1995, which came to be known as the Misgav-Ladach method (11, 12). Some advantages of the Misgav-Ladach technique over the traditional (Pfannenstiel-Kerr) technique include shorter duration of surgery, lower rate of febrile morbidity and less post-operative adhesion formation (11, 13) and less blood loss, so that the Misgav – Ladach technique became popular with obstetricians (14). Some factors such as nutrition status, common diseases of each region, frequent complications of surgery in different societies, economic status of different societies and anatomic differences in individuals of different societies were evaluated to identify the most appropriate techniques of surgery, particularly for c-section (14, 15). Despite the fact that previous studies have confirmed the convenience and advantages of Misgav-Ladach technique, but its

application still faces certain challenges, especially as few clinical trials have assessed it and its long-term outcomes remain unknown. Rupture of uterine scar is a dangerous complication of c-section, particularly after a normal delivery following c-section. The rate of uterine scar rupture in Africa is higher than North America (16, 17). It has been suggested that double-layer uterine repair entails a lower risk of uterine rupture compared to single-layer repair, although no advantages have been reported for double-layer repair over single-layer repair (18, 19). No randomized clinical trial has been conducted to study of the risk of scar rupture in subsequent pregnancies. Study conducted in 2007 reported that with single-layer uterine repair, long-term morbidities, such as adhesion, will be less than the traditional technique; however, the integrity of scar tissue with single-layer uterine repair was not assessed in women who underwent normal delivery after c-section. This is an issue, which requires further studies with larger number of patients (20). In recent years, a lot of changes have been made in c-section techniques (21). Considering the low number of studies in this issue, as well as the ethnic differences and the high prevalence of c-section in developing countries, such as Iran, we conducted the present study to compare of the outcomes of two traditional and Misgav-Ladach techniques during and after surgery.

2. MATERIALS AND METHODS

A randomized clinical trial was conducted in Maternity Research Center, Obs & Gynecology department of teaching Imam Reza Hospital in 2010. The study was approved by the ethics committee of Kermanshah University of medical sciences. Study population consisted of all pregnant women over 37 weeks of gestation who underwent elective or emergency c-section for the first time. Sample size was determined to 186 cases, so that 93 patients were selected in each group (22). Informed consent was obtained from all patients. All surgeries were equally performed for both groups by two surgeons. The first group underwent c-section with the traditional technique and the second group was operated by using the Misgav-Ladach technique. The exclusion criteria were: Hospitalization over 24 hours prior to c-section; Previous surgery with a midline incision below umbilicus; Temperature of over 38°C during the 48 hours before surgery; Using antibiotics during the week before surgery; Multiple pregnancy; History of previous c-section; History of diabetes, hypertension, cardiovascular diseases, coagulative disorders or other systemic diseases. All surgeries were performed under spinal or general anesthesia. Both groups were similar in terms of age, height, and weight and body mass index. Duration of surgery was measured on the end of surgery, and fetal extrusion time was measured from skin incision to delivery. Blood loss during surgery was measured as the amount of blood suctioned. Fever was defined as temperature over 38°C for at least 48 hours. Wounds were examined for complications by a study collaborator on all days of hospital stay and on day 15 after surgery. The amount and frequency of administering

antibiotics and analgesics were measured. The management of pre and post-operative cares was identical for both groups. During the 12 hours after surgery, fluids were provided intravenously and then shifted to oral nutrition. Patients were allowed out of bed 12 hours after surgery. All patients were administered 1 g prophylactic Keflin immediately after cord clamped, and 50 mg pethedine after surgery for pain control. Subsequent doses were adjusted according to patient's needs. In addition, bowel sounds were auscultated until the restoration of bowel function. The major outcomes were studied duration of surgery, fetal extrusion time, blood loss during surgery, need for blood transfusion, need for analgesics, time of bowel function restoration, persistent fever, use of antibiotics, endometritis and wound complications. Kolmogorov-Smirnov (KS) test was used to evaluation of the normality of quantitative data. Variables with normal distribution were analyzed by using parametric test (independent t-test) and Variables with non-normal distribution were analyzed by using non-parametric (Man withny - U test). Chi-square and Fisher's test were used to determine the relationship between qualitative variables. P values < 0.05 were considered significant.

3. RESULTS AND DISCUSSION

The two groups were not significantly different in terms of age, body mass index and gravidity. 25<BMI<30 was more frequent in the traditional group, while BMI<25 and BMI > 30 were more frequent in the Misgav-Ladach group (p=0.928). The number of multiparous women was higher in the Misgav-Ladach group. The indications for c-section were not significantly different between the two groups (Table1 ,Table2 ,Table 3).

Table1 . Differences between two techniques of C-Section

Stages	Group 1	Group 2
	Traditional N=93	Misgav-Ladach N=93
Skin incision	Pfannenstiel	Joel Cohen
Subcutaneous tissue	Sharp dissection	Blunt
Rectus Fascia	Sharp dissection	Blunt
Rectus muscle	Cutting and separation from sub-fascia	Blunt
Peritoneum	Sharp dissection	Blunt
Uterine incision	Sharp dissection	Blunt
Uterine sutures	Double layers	Single layer
Muscle sutures	Figure of Eight Suture	Figure of Eight Suture

Table 2 . Demographic and obstetric characteristics of patients

The average	Group 1 Traditional N=93	Group 2 Misgav- Ladach N=93	Total groups N=186	P Value
Age (years)	26.39	27.97	27.18	0.102
Body mass index (Kg/m ²)	28.12	27.98	28.05	0.928
Gravid	1.69	1.97	1.83	0.61
Parity	0.40	0.74	0.57	0.002*
Gestational age (weeks)	38.48	38.93	38.69	0.020*

Table 3. Frequency of indications of c-section in patients

indications	Frequency	Percent
Cephalopelvic disproportion(CPD)	52	28.3
fetal distress	37	19.9
Breech presentation	24	12.9
Meconium passage	23	12.4
post term pregnancy	13	7
Previous history of Infertility	8	4.3
others	8	4.3
Previous history of anterior-posterior repair	6	3.2
macrosomia	5	2.7
oligohydraminos	4	2.2
failure to progress labor	4	2.2

Both groups were identical in terms of anesthesia. Most patients received spinal anesthesia and using Marcaine with considered significant. The Misgav-Ladach group had significantly smaller duration of surgery, fetal extrusion time, antibiotics use, and length of hospital stay after surgery compared to the traditional group. (Table 4).

Table 4. Intra operative findings and Post-operative outcomes

The average	Group 1 Traditional N=93	Group 2 Misgav- Ladach N=93	Total groups N=186	P.Value
Duration of operation (min)	40.23±7.4	36.17± 1.2	38.2	< 0.001*
Intra operative blood loss (ml)	324.08	313.97	319.03	0.88
Fetal extrusion time (min)	3.31	1.86	2.58	< 0.001*
Frequently prescribed analgesic	2.87 ± 1.37	3.16± 1.29	3.01	0.156
Resumption of Bowel function (hours)	8.36	8.60	8.48	0.189
use of antibiotics (mg)	15.25	7.34	11.3	< 0.001*
Duration of hospitalization (hours)	56.00	49.04	52.54	< 0.001*

The two groups were not significantly different in terms of

number of analgesic administration, duration of bowel function restoration, and blood loss during surgery. Ninety eight percent of patients in the traditional group and 100% of cases in the Misgav-Ladach group required analgesics after surgery (P =0.498). Moreover, 2 patients (2.2%) in the traditional group and 1 patient (1.1%) in the Misgav-Ladach group (yielding a total of 3 (1.6%) patients) had persistent fever after surgery (P = 0.621). Endometritis was not found in either group.2.2% of patients in the traditional group and no patient in the Misgav-Ladach group needed blood transfusion (p=0.497).The wound complications were seroma in 8 patients, hematoma in 1 patient (0.5%), wound opening in 1 patient (0.5%), wound infection in 1 patient (0.5%), and seroma with wound opening in 1 patient (0.5%). Due to the high rate of c-sections, any effort with the aimed of reducing morbidity will be valuable in terms of obstetric health and cost. In the present study, different between two groups was shown in duration of surgery. Mean duration of surgery in the traditional technique and Misgav-Ladach technique was 40.23 ± 7.4 minutes and 36.17 ± 1.2 minutes respectively. In a study by PonamBanerjee duration of surgery was also significantly shorter for the Misgav-Ladach group 16 minutes vs. 28 minutes (22). Shorter duration of surgery means that a shorter time of anesthesia. This finding is corroborated by Gutierrez and Xavier P (15, 23). Similarly, Redich reported a significantly shorter duration of surgery with Misgav-Ladach technique 29.8 min. vs. 49.3 min (24). The present study showed fetal extrusion time was significantly shorter for the Misgav-Ladach group (1.86 minutes) compared to the traditional group (3.31 minutes). This issue is beneficial for the neonate, particularly in cases of fetal distress. The mean fetal extrusion time in the Ponam study consistent with our study, so that in Misgav-Ladach group and traditional group was 1.30 min and 3 min respectively (22). The Misgav-Ladach technique entails smaller amounts of blood loss compared to the traditional technique (1, 2, 22). The mean blood loss during c-section with Misgav-Ladach technique was 350 mL in the Panama study and was 313.97 mL in the present study, whereas in the traditional method, Panama reported 600 mL and we found 324.08 mL blood loss. Our findings do not indicate a significant difference in blood loss between the two techniques. Similarly, Minerva G did not find a significant difference in blood loss between the two techniques (25, 26). Ginecol reported smaller amounts of blood loss with Misgav-Ladach technique (23). Multiple factors influence blood loss during surgery With Misgav-Ladach technique. Abdominal wall hemorrhage is less, which may be accounted for by the avoidance of hemorrhage of perforating vessels. The shorter duration of surgery also affects blood loss (22). Single-layer uterine repair also shortens duration of surgery, with better homeostasis and less febrile morbidity compared to double-layer uterine repair (18). Regarding the short-term complications of surgery, the two groups were not significantly different in terms of number of analgesic administration or duration of bowel function restoration. Nevertheless, antibiotics use was significantly difference in two groups. Minerva G and Ansaloni L reported less pain with Misgav-Ladach considerably (25, 27). Similarly, Gut-

terz found less pain with Misgav-Ladach. On the other hand, Moreina P did not find a significant difference between the two groups in terms of need for analgesics, which is consistent with our findings (28). In the study conducted by Stark M, the Misgav-Ladach group required fewer antibiotics, which is similar to our findings; however, previous studies did not find a significant difference. Regarding bowel function restoration, Xavier and Naki MM did not report a significant difference, which is similar to our finding. However, Minerva reported faster physiologic restoration with Misgav-Ladach (11, 15, 25, 29, 30). Other study showed that the mean duration of surgery, time to first bowel motion and ambulation were significantly shorter in the ML group compared to PB group. Postoperative anaemia, analgesic needs, extra suture use, estimated blood loss and post-operative complications were significantly lower in the ML group compared to PB group (31). The study conducted by Ghahiry showed that the rate of chronic pelvic pain in Misgav-Ladach group was 17.2% versus 35% in the traditional method (32). Ten cases were involved to wound complications, 7 patients were in the traditional group and 3 patients were in the Misgav-Ladach group. In 2006, Ponam reported wound infection in 15 patients (13 in the traditional group and 2 in the Misgav-Ladach group), while we observed only one infection in the Misgav-Ladach group. Seroma was found in 6 patients in the traditional group and 2 patients in the Misgav-Ladach group. Hospitalization in the Misgav-Ladach group was shorter than the traditional group (49.04 hours vs. 52.54 hours), whereas previous studies did not report a significant difference in length of hospital stay between the two groups (22, 25). This may be accounted for shorter duration of surgery time in the Misgav-Ladach group.

REFERENCES

1. Control CfD, Prevention. Rates of cesarean delivery--United States, 1991. MMWR Morbidity and mortality weekly report. 1993;42(15):285.
2. CUNNINGHAM FG, HAUTH JC, STRONG JD, KAPPUS SS. Infectious morbidity following cesarean section: comparison of two treatment regimens. *Obstetrics & Gynecology*. 1978;52(6):656-61.
3. Pfannenstiel J. On the advantages of a transverse cut of the fascia above the symphysis for gynecological laparotomies, and advice on surgical methods and indications. *Samml Klin Vortr Gynakol*. 1897;68:1-22.
4. Kerr JM. The technique of cesarean section with special reference to the lower uterine segment incision. *Am J Obstet Gynecol*. 1926;12:729-34.
5. Mathai M, Hofmeyr GJ. Abdominal surgical incisions for caesarean section. *Cochrane Database Syst Rev*. 2007;1.
6. Baskett TF, Calder AA, Arulkumaran S. Munro Kerr's Operative Obstetrics: Elsevier Health Sciences; 2014.
7. Baskett TF, Calder AA, Arulkumaran S. Munro Kerr's Opera-

4. CONCLUSION

The findings of the present study indicated that duration of surgery time in the Misgav-Ladach technique was shorter than the traditional technique; in the Misgav-Ladach technique, fetal extrusion was faster, less need for antibiotics and hospitalization was shorter than the traditional technique. Although no adverse complication was found on short-term follow-up, this technique must be followed up on a long-term scale to evaluate the risk of abdominal adhesions or uterine rupture following subsequent cesarean deliveries. We recommend the Misgav-Ladach technique to replace the traditional technique in patients who do not wish to become pregnant in the future or those who wish to perform tubal ligation during cesarean section.

ACKNOWLEDGMENT

This study has been supported by Kermanshah University of Medical Sciences, and registered under code IRCT138933044025N1 in the Iranian Center of Clinical Trials. We would like to thank all the staff of Kermanshah Imam Reza Hospital.

AUTHORS CONTRIBUTION

This work was carried out in collaboration between all authors.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

8. Joel-Cohen S. Abdominal And Vaginal Hysterectomy;; New Techniques Based On Time And Motion Studies, Author: S Joel-Cohen, Publisher: Li. 1972.
9. Chapman SJ, Owen J, Hauth JC. One-versus two-layer closure of a low transverse cesarean: the next pregnancy. *Obstetrics & Gynecology*. 1997;89(1):16-8.
10. Grundsell HS, Rizk DE, Kumar RM. Randomized study of non-closure of peritoneum in lower segment cesarean section. *Acta obstetrica et gynecologica Scandinavica*. 1998;77(1):110-5.
11. Stark M, Finkel AR. Comparison between the Joel-Cohen and Pfannenstiel incisions in cesarean section. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 1994;53(2):121-2.
12. Holmgren G, Sjöholm L, Stark M. The Misgav Ladach method for cesarean section, method description. *Acta obstetrica et gynecologica Scandinavica*. 1999;78(7):615-21.
13. Stark M, Chavkin Y, Kupfersztain C, Guedj P, Finkel A. Evaluation of combinations of procedures in cesarean section.

- International Journal of Gynecology & Obstetrics. 1995;48(3):273-6.
14. Björklund K, Kimaro M, Urassa E, Lindmark G. Introduction of the Misgav Ladach caesarean section at an African tertiary centre: a randomised controlled trial. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2000;107(2):209-16.
15. Xavier P, Ayres-De-Campos D, Reynolds A, Guimarães M, Costa-Santos C, Patrício B. The modified Misgav-Ladach versus the Pfannenstiel-Kerr technique for cesarean section: a randomized trial. *Acta obstetrica et gynecologica Scandinavica*. 2005;84(9):878-82.
16. Boulvain M, Fraser WD, Brisson-Carroll G, Faron G, Wal-last E. Trial of labour after caesarean section in sub-Saharan Africa: ameta-analysis. *BJOG: An International Journal of Obstetrics & Gynaecology*. 1997;104(12):1385-90.
17. George A, Arasi K, Mathai M. Is vaginal birth after cesarean delivery a safe option in India? *International Journal of Gynecology and Obstetrics*. 2004;85(1):42-3.
18. Hauth JC, Owen J, Davis RO. Transverse uterine incision closure: one versus two layers. *American journal of obstetrics and gynecology*. 1992;167(4):1108-11.
19. Durnwald C, Mercer B. Uterine rupture, perioperative and perinatal morbidity after single-layer and double-layer closure at cesarean delivery. *American journal of obstetrics and gynecology*. 2003;189(4):925-9.
20. Nabhan A. Long-term outcomes of two different surgical techniques for cesarean. *International Journal of Gynecology & Obstetrics*. 2008;100(1):69-75.
21. Hofmeyr JG, Novikova N, Mathai M, Shah A. Techniques for cesarean section. *American journal of obstetrics and gynecology*. 2009;201(5):431-44.
22. Banerjee B, Singh S, Raina A. The Misgav Ladach method: a step forward in the operative technique of caesarean section. 2006.
23. Gutiérrez J, Coló J, Arreola M. [Comparative trial between traditional cesarean section and Misgav-Ladach technique]. *Ginecologia y obstetricia de Mexico*. 2008;76(2):75-80.
24. Redlich A, Köppe I. [The "gentle caesarean section"-an alternative to the classical way of sectio. A prospective comparison between the classical technique and the method of Misgav Ladach]. *Zentralblatt für Gynäkologie*. 2001;123(11):638-43.
25. Belci D, Kos M, Zoricic D, Kuharić L, Slivar A, Begić-Razem E, et al. Comparative study of the "Misgav Ladach" and traditional Pfannenstiel surgical techniques for cesarean section. *Minerva ginecologica*. 2007;59(3):231-40.
26. Enkin MW, Wilkinson C. Single versus two layer suturing for closing the uterine incision at caesarean section. *The Cochrane Library*. 2006.
27. Ansaloni L, Brundisini R, Morino G, Kiura A. Prospective, randomized, comparative study of Misgav Ladach versus traditional cesarean section at Nazareth Hospital, Kenya. *World journal of surgery*. 2001;25(9):1164-72.
28. Moreira P, Moreau J, Faye M, Ka S, Kane GS, Faye E, et al. [Comparison of two cesarean techniques: classic versus Misgav Ladach cesarean]. *Journal de gynécologie, obstétrique et biologie de la reproduction*. 2002;31(6):572-6.
29. Chitra K, Gayetri R, Shanthi S. Misgav-Ladach cesarean section vs Pfannenstiel cesarean section. *J Obstet Gynecol Ind*. 2004;54:473-7.
30. Naki MM, Api O, Çelik H, Kars B, Yasar E, Ünal O. Comparative study of Misgav-Ladach and Pfannenstiel-Kerr cesarean techniques: a randomized controlled trial. *Journal of Maternal-Fetal and Neonatal Medicine*. 2011;24(2):239-44.
31. Ezechi O, Ezeobi P, Gab-Okafor C, Edet A, Nwokoro C, Akinlade A. Maternal and fetal effect of misgav ladach cesarean section in Nigerian Women: A randomized control study. *Annals of medical and health sciences research*. 2014;13(3):577-82.
32. Ghahiry A, Rezaei F, Karimi Khouzani R, Ashrafinia M. Comparative analysis of long-term outcomes of Misgav Ladach technique cesarean section and traditional cesarean section. *Journal of Obstetrics and Gynaecology Research*. 2012;38(10):1235-9.