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Comparison of Joel-Cohen Incision and Pfannenstiel Incision for Caesarean Section

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Abstract

Introduction: Caesarean section is a widely performed surgical procedure for women globally, aimed at reducing maternal and fetal risks. This is particularly important as emergency C-sections are associated with multiple complications compared to vaginal deliveries and choice of abdominal incision has been correlated with incidence of complications.

Aim: The objective of this study is to compare the outcomes of the Joel-Cohen incision and the Pfannenstiel incision in caesarean section procedures.

Methodology: This hospital-based, prospective, randomized comparative study was conducted in the Department of Obstetrics and Gynecology at PBM Hospital, Bikaner, over the course of one year. The study population included pregnant women admitted to the labor room with indications for caesarean section.

Results: The study found that the Joel-Cohen technique was associated with significantly reduced operative times, faster fetal delivery, lower postoperative pain, decreased analgesic requirements, and shorter hospital stays.

Keywords: Caesarean, abdominal incision, eclampsia twin pregnancies

Introduction

Caesarean section (C-section) is a common surgical procedure performed on women worldwide, with approximately 18.5 million operations conducted annually. The rates of C-sections vary significantly across the globe: about 40% of countries report rates below 10%, around 10% countries have rates between 10% and 15%, and in nearly 50% countries pexceed 15%[1]. In India, the National Family Health Survey (NFHS-4)[2] indicated that 17% of live births in the five years preceding the survey were delivered via C-section, with 45% of these being scheduled after labour had begun. C-sections can be categorized as planned (elective) or unplanned (emergency)[3], often based on complex and multifactorial indications that prioritise the safety of the mother, the baby, or both. Common reasons for performing a C-section include foetal distress, a history of previous C-sections, cephalopelvic disproportion, eclampsia, preeclampsia, malpresentation, placenta previa, and twin pregnancies when the first foetus is not in a head-down position. Some women also choose C-sections due to a fear of natural childbirth. While C-sections can be lifesaving in certain circumstances, they tend to be more costly than vaginal deliveries and carry potential risks, including infections, bleeding, anaemia, and the necessity for blood transfusions. It is essential to minimise these risks, particularly as emergency C-sections are associated with higher complication rates compared to planned ones. There is no consensus on the best strategies for reducing risks and morbidity associated with C-sections. Various techniques for skin incision and abdominal wall opening have evolved over time in an attempt to improve outcome. The choice of technique is influenced by the surgeon's experience, preferences, and the clinical conditions of both the mother and the foetus. C-sections can be performed using various techniques, each evaluated in randomised clinical trials, with the two most common types of abdominal incisions being vertical (such as midline and paramedian) and transverse (including Pfannenstiel, Pelosi, Maylard, Cherney, and Joel-Cohen)[4]. The Pfannenstiel incision[5], the first transverse method introduced, is made two finger-breadths above the pubic symphysis, extending laterally towards the anterior superior iliac spines (ASIS) and ending 2-3 cm medial to the ASIS on both sides. In contrast, the Joel-Cohen technique[6] features a straight transverse incision approximately 3 cm below the ASIS, where the peritoneum is opened through a small transverse cut at the midline, minimising bladder wall injury[7]. Each incision method has distinct advantages and drawbacks, making the choice of technique reliant on the patient's health and the surgeon's preferences. Given the prevalence of Pfannenstiel and Joel-Cohen incisions in cesarean sections, this study aims to assess and compare the incidence of complications associated with these techniques[8]. Specifically, it will evaluate total surgery time, blood loss, postoperative pain (using the Visual Analog Scale), early oral feeding, complications, postoperative hospital stay, and APGAR scores at one and five minutes.

Aim

To compare between Joel–Cohen incision and Pfannenstiel ncision for caesarean section

Methodology: This study employed a hospital-based, prospective, randomized comparative design conducted in the Department of Obstetrics and Gynecology at PBM Hospital, Bikaner, over a one-year period. The study population included pregnant women admitted to the labor room with indications for cesarean section.

Inclusion criteria were: female patients aged 18 to 40 years, those willing to participate in the study, patients with a gestational age of over 34 weeks, and those with valid medical indications for a C-section.

Exclusion criteria included: women with a history of previous cesarean sections or other abdominal surgeries that could result in internal adhesions, morbid obesity, multifetal pregnancies, antepartum hemorrhage, and other factors that could impact the surgical procedure or postoperative recovery. Patients who declined to provide consent were also excluded from the study.

The sampling method employed was convenience sampling, and the sample size was calculated to include 250 pregnant women, with 125 participants assigned to each group. This sample size was determined to ensure a study power of 80% and an alpha error of 5%, using MEDCALC statistical software. The calculation was based on a reported cesarean section prevalence of 17.2% among pregnant women, utilizing a 5% alpha level and 20% beta level. The sample size was calculated using the formula $N = 4pq/l^2$.

Participants were randomly assigned to either the Joel-Cohen or Pfannenstiel incision groups using computer-generated random numbers, with 125 cases allocated to each group after meeting the eligibility criteria.

Result

Table 1: Distribution of cases according to their Age

Age Distribution (Years)	Group A		Group B	
	N	(%)	N	(%)
21-25	53	42.40	54	43.20
26-30	53	42.40	51	40.80
31- 35	16	12.80	15	12.00
>35	3	2.40	5	4.00
Total	125	100	125	100
Mean ± Sd	26.43 ± 4.07		25.61 ± 4.10	
p value	0.1		14	

Majority of the subjects were of 21-25 and 26 – 30 years of age in group A (42.40%) and group B (43.20% and 40.80% respectively) whereas minimum were of >35years of age in group A (2.40%) and group B (4.00%). The mean age in group A was 26.43 ± 4.07 yrs and in group B, it was 25.61 ± 4.10 years. In the present study, the two groups were comparable with regard to age distribution. (p=0.114)

Table 2: Comparison of surgical /operating duration between the two groups

Duration of surgery (in minutes)	Group A		Group B	
	N	(%)	N	(%)
16 – 25	32	25.60	12	9.60
26 – 35	82	65.60	48	38.40
36 - 45	11	8.80	65	52.00
Total	125	100.00	125	100.00
Mean ± SD	30.44 ± 5.12		39.75 ± 4.18	
Range (min.)	20 – 40		30 – 45	
p Value	0		.0001	

65.60% subjects in group A were operated in 26 – 35 min. and minimum 8.80% were in 36-45 min whereas in group B, 52.00% were operated in 36-45 min. and 9.60% were in 16 – 25 hrs. Mean operating time in group A was 30.44 ± 5.12 min. (range 20 – 40 min.) and 39.75 ± 4.18 min. (30 – 50 min.) in group B. The difference between the two groups with regard to operating time was found statistically significant. (p=0.0001)

Table 3: Comparison of incision to delivery time between two groups

Time to deliver baby	Group A	Group B
Mean ± SD	3.2 ± 0.52	5.19 ± 1.41
Range (min.)	2 – 5	2 – 9
p Value	0.0	001**

Mean delivery time in group A was 3.2 ± 0.52 min. (range 2 – 5 min.) and 5.19 ± 1.41min. (2 – 9 min.) in group B. The difference between the two groups with regard to operating time was found statistically significant. (p=0.0001)

Table 4: Distribution of cases according to severity of pain by VAS score

VAS score	Group A	Group B	
Immediate post operative	3.78 ± 0.73	3.73 ± 0.71	0.584
At 6 hr	5.42 ± 1.2	6.25 ± 1.3	0.0001
At 12 hr	4.65 ± 1.5	5.2 ± 1.1	0.001

Mean VAS score in group A was 3.78 ± 0.73 at immediate post operative and 3.73 ± 0.71min. in group B. The difference between the two groups with regard to severity of pain was found statistically insignificant. (p=0.584) At 6 hr mean VAS score in group A was 5.42 ± 1.2 and 6.25 ± 1.3 in group B. The difference between the two groups with regard to severity of pain was found statistically significant. (p=0.0001) At 6 hr mean VAS score in group A was 4.65 ± 1.5 and 5.2 ± 1.1 in group B. The difference between the two groups with regard to severity of pain was found statistically significant. (p=0.0001)

Table 5: Distribution of cases according to additional requirement of Analgesic other then baseline analgesia

Requirement of Analgesia	Group A		Group B		P value
	N	(%)	N	(%)	
Up to 6 hr	55	44.00	72	57.60	0.043**
6 – 12 hr	82	65.60	92	73.60	0.216
>12 hr	22	25.60	51	32.80	0.0001**
P value	0.047				

Post operatively baseline analgesia was given as per protocol. 65.60% subjects in group A needed analgesia at 6 – 12 hrs and minimum 25.60% needed at >12 hrs whereas in group B, 73.60% were needed at 6 – 12 hr and minimum 32.80% were needed at >12hrs and the difference between the two groups was found statistically significant. (p=0.047)

Table 6: Distribution of cases according to time taken to oral intake

Post op stay	Group A		Group B	
	N	(%)	N	(%)
5 – 7 days	86	68.80	62	49.60
8 – 10 days	29	23.20	45	36.00
11 – 13 days	10	8.00	18	14.40
Total	125	100.0	125	100.0
Mean	6.13 ± 0.75		8.47 ± 2.08	
P value	0.0001			

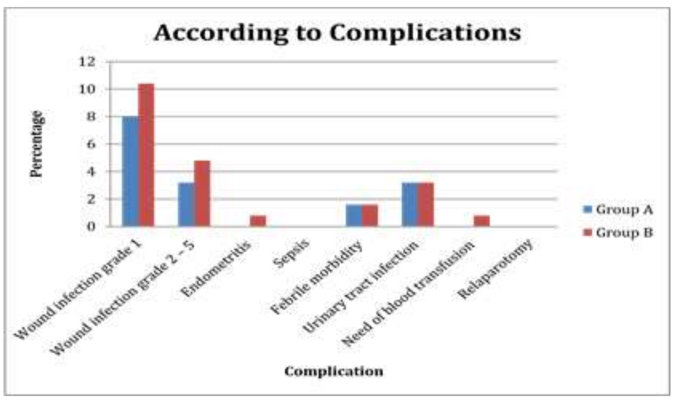
Maximum 68.80% subjects in group A had 5 – 7 days stay and minimum 8.00% up to 11-13 days whereas in group B, 49.60% had 5 – 7 days stay and minimum 14.40% up to 11-13 days. Mean Post op stay was 6.13 ± 0.75 days in group A and 8.47 ± 2.08 days in group B and the difference between the two groups was found statistically significant. (p=0.0001)

Table 7: Comparison of APGAR score at 5 min. between two groups

At 5 min.	Group A	Group B
Mean ± SD	7.85 ± 0.95	7.78 ± 0.91
Range	6 - 9	6 – 9
P value	0.5	52

Mean APGAR score in group A was 7.85 ± 0.95 (6 – 9 min.) at 5 min. and 7.78 ± 0.91 (6 - 9 min.) in group B and the difference between the two groups with regard to APGAR was found statistically insignificant. (p=0.552)

Graph 1: Distribution of cases according to Complications



Although the rate of complication was lower in both groups, 8.00% subjects in group A had wound infection grade 1st followed by 3.2% urinary tract infection, wound infection grade 2nd to 5th, and minimum 1.60% had febrile morbidity whereas in group B, 10.4% developed wound infection of grade 1st followed by 4.8% had wound infection of grade 2 – 5, and minimum 0.80% had endometritis and need of blood transfusion and the difference between the two groups was found statistically insignificant. (p=0.732)

Discussion

The majority of participants in Group A were aged 21-25 years (42.40%) and 26-30 years (42.40%), while in Group B, most were aged 26-30 years (43.20%) and 21-25 years (40.80%). The smallest age group in both cohorts comprised women older than 35 years (Group A: 2.40%, Group B: 4.00%). The mean age was 26.43 ± 4.07 years in Group A and 25.61 ± 4.10 years in Group B, with no statistically significant difference between the groups (p=0.114). This finding aligns with the results reported by Wessam Magdy Abuelghar et al. (2013)[9], who found no significant age difference between the Joel-Cohen group (mean age 26.75±3.7 years) and the Pfannenstiel group (mean age 26.53±3.65 years). Similarly, Ayatollahi H et al. (2022)[10] reported mean ages of 26.72 ± 7.43 years in the Pfannenstiel group and 21.44 ± 6.51 years in the Joel-Cohen group, with no statistically significant difference (p=0.84).

In our study, 65.60% of participants in Group A underwent surgery within 26–35 minutes, with a minimum of 8.80% requiring 36–45 minutes. In contrast, 52.00% of participants in Group B had surgery lasting 36–45 minutes, while 9.60% were operated on within 16–25 minutes. The mean operating time in Group A was 30.44 ± 5.12 minutes (range: 20–40 minutes), compared to 39.75 ± 4.18 minutes (range: 30–50 minutes) in Group B. The difference in operating time between the two groups was statistically significant (p=0.0001). These findings align with those of Ayatollahi H et al. (2022)[10] who reported a mean operating time of 26.06 ± 5.21

minutes for the Joel-Cohen method, compared to 36 ± 6.16 minutes for the Pfannenstiel method (p<0.001). Our results are also consistent with a meta-analysis by, Alireza Olyaeemanesh et al. (2017)[11] which found the Joel-Cohen technique to be more effective, with a significantly shorter operation time compared to the transverse Pfannenstiel incision (WMD -9.78 minutes; 95% CI: -14.49 to -5.07 minutes, p<0.001). Shyama Prasad Saha et al. (2012)[12] reported a significantly shorter mean total operative time in the modified Joel-Cohen group compared to the Pfannenstiel group (29.81 vs. 32.67 minutes, p<0.0001, 95% CI=2.253 to 3.467).

The mean fetal delivery time in Group A was 3.2 ± 0.52 minutes (range: 2–5 minutes), compared to 5.19 ± 1.41 minutes (range: 2–9 minutes) in Group B, with the difference being statistically significant (p=0.0001). This result is consistent with the findings of Ayatollahi H et al. (2022)[13], who reported a mean fetal delivery time of 4.56 ± 0.97 minutes for the Joel-Cohen method and 5.80 ± 1.03 minutes for the Pfannenstiel method (p<0.0001).

In terms of postoperative pain, the mean Visual Analog Scale (VAS) score in Group A was 3.78 ± 0.73 immediately postoperatively, compared to 3.73 ± 0.71 in Group B. At 6 hours postoperatively, the mean VAS score in Group A was 5.42 ± 1.2, compared to 6.25 ± 1.3 in Group B. At 12 hours, the mean VAS score was 4.65 ± 1.5 in Group A and 5.2 ± 1.1 in Group B. The difference in pain severity between the two groups was statistically significant at both 6 and 12 hours postoperatively. These findings are consistent with the study by Ayatollahi H et al. (2022)[10], which found a significant difference in pain intensity between the two groups (p<0.001). Additionally,) Wessam Magdy Abuelghar et al. (2013)[9] reported significantly lower mean VAS scores at 6, 12, and 18 hours postoperatively in the Joel-Cohen group (52.8±13.0, 31.5±12.8, and 16.3±6.9, respectively) compared to the Pfannenstiel group (67.5±12.1, 43.7±15.4, and 23.1±9.5, respectively) (p<0.001)

In our study, 65.60% of participants in Group A required analgesia within 6–12 hours postoperatively, with a minimum of 25.60% requiring analgesia after more than 12 hours. In comparison, 73.60% of participants in Group B required analgesia within 6–12 hours, with a minimum of 32.80% needing it after more than 12 hours. The difference in analgesic requirement between the two groups was statistically significant (p=0.047). These findings are consistent with those of, Dubravko Habek et al. (2020)[14] who reported a prolonged need for analgesics until the fifth postoperative day in the Pfannenstiel group, whereas in the Joel-Cohen group, analgesic use was reduced to only 10% by the second day (p < 0.0005). Additionally, a meta-analysis by Alireza Olyaeemanesh et al. (2017)[11] supports the greater efficacy of the Joel-Cohen technique compared to the transverse Pfannenstiel incision, particularly in reducing postoperative hospital stay (WMD -0.69 days; 95% CI: -1.4 to -0.03 days, p<0.001). Shyama Prasad Saha et al. (2012)[12] similarly found that the requirement for strong analgesics were significantly higher in the Pfannenstiel group (53.64% vs. 21.85%, p<0.0001).

In our study, 49.60% of subjects in Group A initiated oral feeding within the first day, 30.40% within 1-2 days, and the remaining 1.60% after 3 days. In contrast, in Group B, 32.80% began oral feeding within the first day, 30.40% within 1-2 days, and 5.60% after 3 days. The mean time to start oral feeding was 1.69 ± 0.87 days in Group A and 2.49 ± 0.94 days in Group B, with a statistically significant difference between the two groups (p=0.0001).

Regarding postoperative hospital stay, 68.80% of subjects in Group A had a stay of 5-7 days, with only 8.00% staying 11-13 days. In Group B, 49.60% had a 5-7 day stay, while 14.40% remained hospitalised for 1113 days. The mean postoperative stay was 6.13 ± 0.75 days in Group A and 8.47 ± 2.08 days in Group B, with this difference also being

statistically significant (p=0.0001). In comparison Ayatollahi H et al. (2022)[10] reported a mean hospitalisation duration of 2.34 ± 0.47 days in the Pfannenstiel group and 2.18 ± 0.38 days in the Joel-Cohen group, with no significant difference observed between these two groups (p=0.06).

Regarding postoperative complications, although the overall complication rates were low in both groups, 8.00% of participants in Group an Experienced Grade 1 wound infections, followed by 3.2% with urinary tract infections, and a small percentage with Grade 2–5 wound infections. The lowest incidence was 1.60% for febrile morbidity. In Group B, 10.4% of participants developed Grade 1 wound infections, 4.8% experienced Grade 2–5 wound infections, and a minimum of 0.80% had endometritis or required blood transfusions. The difference in complication rates between the two groups was not statistically significant (p=0.732). These results are comparable to the findings of Dubravko Habek et al. (2020)[14], who reported that perioperative and postoperative complications were significantly more frequent with the Pfannenstiel method including perioperative haemorrhage, more frequent adhesions, plastic peritonitis in repeat caesarean sections, and two cases of bladder lesions (p < 0.0005).

Conclusion

Caesarean section is one of the most frequently performed major abdominal surgeries, often carried out by surgeons with varying levels of experience. It is essential to identify a standardised abdominal entry technique that minimises postoperative discomfort and enhances patient outcomes. Our study indicates that the Modified Joel-Cohen technique may be superior to the Pfannenstiel method. The Joel-Cohen approach significantly reduces operative and delivery times, decreases postoperative pain and analgesia requirements, and allows for earlier initiation of oral feeding and a shorter postoperative hospital stay. These findings suggest that the Modified Joel-Cohen method could be a more effective and efficient technique for caesarean section.

References

1. Ronsmans C, Holtz S, Stanton C. Socioeconomic differentials in caesarean rates in developing countries: A retrospective analysis. Lancet. 2006;368:1516–23.
2. National Collaborating Centre for Women’s and children's health (UK). Caesarean section. RCOG press; London 2011.
3. Torloni MR, Betran AP, Souza JP, Widmer M, Allen T, Gulmezoglu M, et al. Classifications for caesarean section: A systematic review. PLoS One. 2011;6:e14566.
4. Franchi M, Ghezzi F, Raio L, Di Naro E, Miglierina M, et al. (2002) Joel-Cohen or Pfannenstiel incision at caesarean delivery: does it make a difference? Acta Obstet Gynecol Scand 81: 1040–6. doi: 10.1034/ j.1600-0412.2002.811108.x PMID: 12421172
5. Pfannenstiel J. On the advantages of a transverse cut of the fascia above the symphysis for gynaecological laparotomies, and advice on surgical methods and indications. Samml Klin Vortr Gynakol. 1987; 68:1–22.
6. Joel-Cohen S. Abdominal and Vaginal Hysterectomy: New Techniques Based on Times and Motion Studies. London: Heinemann; 1972.

7. Kerr JMM. The technic of caesarean section with special reference to the lower uterine segment incision. Am J Obstet Gynecol. 1926;12: 729–734.
8. Nabhan AF. Long-term outcomes of two different surgical techniques for cesarean. Int J Gynaecol Obstet. 2008;100:69–75. doi: 10.1016/j.ijgo.2007.07.011.
9. Abuelghar WM, El-Bishry G, Emam LH. Caesarean deliveries by Pfannenstiel versus Joel-Cohen incision: A randomised controlled trial. J Turk Ger Gynecol Assoc. 2013 Dec 1;14(4):194-200. doi: 10.5152/jtgga.2013.75725. PMID: 24592105; PMCID: PMC3935539.
10. Anusha SR, Deepak AV, Jacob KJ. Maternal and neonatal outcome in second stage caesarean section versus first stage: a comparative study. Int J Reprod Contracept Obstet Gynecol 2018;7:
11. Olyaeemanesh A, Bavandpour E, Mobinizadeh M, Ashrafinia M, Bavandpour M, Nouhi M. Comparison of the Joel-Cohen-based technique and the transverse Pfannenstiel for caesarean section for safety and effectiveness: A systematic review and meta-analysis. Med J Islam Repub Iran. 2017 Sep 4;31:54. doi: 10.14196/mjiri.31.54. PMID: 29445683; PMCID: PMC5804473.
12. Saha SP, Bhattarcharjee N, Das Mahanta S, Naskar A, Bhattacharyya SK. A randomized comparative study on modified Joel-Cohen incision versus Pfannenstiel incision for caesarean section. J Turk Ger Gynecol Assoc. 2013 Mar 1;14(1):28-34. doi: 10.5152/jtgga.2013.07. PMID: 24592067; PMCID: PMC3881734.
13. Mackeen AD, Packard RE, Ota E, Berghella V, Baxter JK. Timing of intravenous prophylactic antibiotics for preventing postpartum infectious morbidity in women undergoing caesarean delivery. Cochrane Database Syst Rev. 2014 Dec 05;(12):CD009516. [PubMed]
14. Habek D, Cerovac A, Luetić A, Marton I, Prka M, Kulaš T, Ujević B. Modified Stark's (Misgav Ladach) caesarean section: 15 - year experience of the own techniques of caesarean section. Eur J Obstet Gynecol Reprod Biol. 2020 Apr;247:90-93. doi: 10.1016/j.ejogrb.2020.02.026. Epub 2020 Feb 14. PMID: 32087422.