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RESEARCH ARTICLE

INTRA-OPERATIVE INSTILLATION OF STEROIDS INJECTIONS (DEXAMETHASONE) DURING CAESAREAN SECTION TO REDUCE EARLY AND LATE POST-OPERATIVE MORBIDITY

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ABSTRACT

Objective: *To evaluate whether intra-operative intra-peritoneal instillation of dexamethasone reduces immediate and late post-operative morbidity following caesarean section.*

Study Type: *Interventional comparative study*

Place and Duration of Study: *Tertiary care hospital in Pakistan from 12 January 2020 to 22 December 2022.*

Patients & Methods: *A total of 400 women undergoing elective caesarean section were recruited, divided equally into four categories: primigravida and those with 1, 2, or 3 previous caesarean sections. Within each group, 50 patients received intra-peritoneal dexamethasone (3 ml), and 50 served as controls. Post-operative pain was assessed at 6–12 hours, 12–24 hours, and on the first post-operative day. Early mobilization, oral intake, and overall well-being were also recorded. A subgroup of 41 women returning for repeat caesarean section one year later were evaluated for intra-operative adhesions.*

Results: *Patients who received dexamethasone reported fewer pain complaints and required less additional analgesia compared with controls. On the first post-operative day, additional pain relief was needed in 30–40% of controls versus 12–16% of those receiving dexamethasone. Early mobilization was achieved by 66–76% of the dexamethasone group versus 36–44% of controls. Oral intake and overall well-being were also better in the dexamethasone group. At follow-up, more patients in the intervention group were comfortable at home, and fewer adhesions were noted in women who had received dexamethasone during prior surgery.*

Conclusion: *Intra-peritoneal instillation of dexamethasone during caesarean section is associated with reduced post-operative pain, earlier recovery, and less morbidity.*

Keywords: *Adhesions, Caesarean section, Dexamethasone*

INTRODUCTION

Gynecological and obstetric surgeries, particularly caesarean section, are among the most frequently performed operative procedures worldwide. Although advances in surgical techniques and peri-operative care have improved patient outcomes, post-operative complications remain a major source of maternal morbidity and healthcare burden.[1] These complications include pain, surgical site infection, ileus, haemorrhage, delayed mobilization, prolonged hospital stays, and intra-abdominal adhesion formation.[2]

Post-operative pain is one of the most common early complications following abdominal and pelvic surgery and has a direct effect on recovery and quality of life. Inadequate pain control delays ambulation, prolongs hospitalization, impairs oral intake, and increases the risk of thromboembolic events and pulmonary complications. In gynecological surgery, tissue trauma and the inflammatory response associated with surgical

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manipulation contribute significantly to post-operative morbidity.[3]

Caesarean section has shown a steady global rise over recent decades. While generally considered safe, repeat caesarean deliveries are associated with increasing operative difficulty and post-operative complications, including haemorrhage, infection, bladder injury, chronic pelvic pain, and adhesions.[4] Studies have demonstrated that adhesions become more prevalent with each subsequent surgery and may increase operative time, blood loss, and technical difficulty in future procedures.[5]

The pathophysiology of post-operative complications is closely related to the inflammatory cascade initiated by tissue injury. Surgical trauma triggers release of cytokines, inflammatory mediators, fibrin deposition, fibroblast proliferation, and vascular permeability changes, all of which contribute to pain, edema, and adhesion formation. These inflammatory processes begin immediately after surgery and are most active during the first postoperative week.[6]

Traditionally, reduction of post-operative morbidity has relied on meticulous surgical technique, including gentle tissue handling, adequate haemostasis, minimization of tissue ischemia, and prevention of infection.[7,8] In recent years, attention has shifted toward pharmacological agents that may modulate the inflammatory response and improve postoperative recovery.[9] Various agents, including non-steroidal anti-inflammatory drugs, corticosteroids, and barrier materials, have been investigated for their role in reducing post-operative complications and adhesion formation.[10, 11]

Dexamethasone, a potent corticosteroid with anti-inflammatory and anti-edematous properties, has been widely used in surgical practice to reduce postoperative nausea, vomiting, pain, and inflammatory reactions. Experimental and clinical studies suggest that dexamethasone may also reduce fibrin deposition and fibroblast activity, thereby limiting adhesion formation and improving post-operative recovery.[12]

The objective of the study was to evaluate the effect of intra-operative intraperitoneal instillation of a single dose of dexamethasone during caesarean section and assess its role in reducing post-operative morbidity and improving recovery outcomes.

PATIENTS AND METHODS

This comparative interventional study was carried out in the operation theatre recovery area, surgical ITC, and post-operative ward between 12 January 2020 and 22 December 2022 (IERC/OBS/2021/09). A total of 1,335 patients were screened, and 400 who met the inclusion criteria were selected by convenience sampling. The inclusion criteria included patients undergoing elective caesarean section under spinal anaesthesia and primigravida and women with one, two, or three previous caesarean sections.

The exclusion criteria were as follows:

- Patients undergoing caesarean section under general or epidural anaesthesia.
- Women with a previous caesarean section attempting Vaginal Birth After Caesarean (VBAC) or Trial of Labor After Caesarean (TOLAC).
- Women with four or more previous caesarean sections.
- Women with prior gynaecological surgeries such as myomectomy, cystectomy, or laparoscopy.

These patients underwent elective caesarean section.

Patients were divided into four categories, each with 100 participants:

- Category I: Primigravida
- Category II: Previous 1 caesarean section
- Category III: Previous 2 caesarean sections
- Category IV: Previous 3 caesarean sections

Within each category, 50 patients received intra-peritoneal instillation of dexamethasone (3 ml) intra-operatively, sprayed using a 3 cc syringe, while 50 patients served as controls.

Post-operative pain intensity was recorded using a standardised pain score proforma at 6–12 hours, 12–24 hours, and on the first post-operative day in both the surgical ITC and post-operative ward. Hydration with Ringer lactate and injection Falgan (paracetamol) 8-hourly were given as per hospital protocol. Patients who required analgesia beyond the routine pain relief were documented.

On the operative day and first post-operative day, data were also collected regarding postural change, mobility, oral intake (fluids and semi-solids), and overall well-being.

During the second year of the study, 41 patients who presented for repeat caesarean section and had received dexamethasone during their previous operation one year earlier were assessed for the intra-operative intensity of

adhesions.

All data were tabulated, and percentages were calculated. Statistical analysis was performed using SPSS version 22, with results compared between the two groups.

RESULTS

A total of 400 women were included in the study (100 per category). The results demonstrated significant differences in morbidity between women who received intra-peritoneal dexamethasone (Group II) and those who did not (Group I).

Pain Complaint (Tables I & II):

- In **Group I**, during the first 6–12 hours, 18% of primigravida and women with one previous caesarean section, 22% with two, and 36% with three caesarean sections reported pain despite routine analgesia.
- In **Group II**, the rates were lower: 10% of primigravida, 14% with one previous section, 10% with two, and 8% with three previous sections.

During 12–24 hours post-operatively:

- **Group I:** 30% of primigravida, 32% with one previous section, 34% with two, and 36% with three previous sections reported pain.
- **Group II:** 16% of primigravida and those with one previous section, 18% with two, and 14% with three previous sections reported pain.

On the first post-operative day:

- **Group I:** Additional analgesia beyond paracetamol was required by 30% of primigravida, 30% with one previous section, 36% with two, and 40% with three caesarean sections.
- **Group II:** Only 16% of primigravida, 14% with one and two previous sections, and 12% with three caesarean sections required additional pain relief.

Mobility and Well-Being (Tables III & IV):

- In **Group I**, early postural change was observed in 50% of primigravida, 40% of women with one previous section, and 36% with two or three sections. Early mobilization occurred in 36–44% of women across the groups. Oral intake was resumed in 36–50% of patients.
- In **Group II**, early postural change was more frequent: 64% of primigravida, 68% with one previous section, 72% with two, and 60% with three sections. Early mobilization was achieved in 66–76%

Table I: Pain complaint in group 1 patients not instilled with intra-operative dexamethasone and routine pain relief injections during post-operative period

Serial No.	Category	Pain complaint during first 6-12 hours post-operatively n=50	Pain complaint during 12 - 24 hours post-operatively n=50	Pain complaint during first post-operative day n=50
1.	Primigravida	9(18%)	15(30%)	15(30%)
2.	Previous 1 C section	9(18%)	16(32%)	15(30%)
3.	Previous 2 C section	11(22%)	17(34%)	18(36%)
4.	Previous 3 C section	9(18%)	18(36%)	20(40%)

Table II: Pain complaint in group II patients instilled with intra-operative dexamethasone and routine pain relief injections during post-operative period

Serial No.	Category	Pain complaint during first 6-12 hours post-operatively n=50	Pain complaint during 12-24 hours post-operatively n=50	Pain complaint during first post-operative day n=50
1.	Primigravida	5(10%)	8(16%)	8(16%)
2.	Previous 1 C section	7(14%)	8(16%)	7(14%)
3.	Previous 2 C section	5(10%)	9(18%)	7(14%)
4.	Previous 3 C section	4(8%)	7(14%)	6(12%)

Table III: Well-being of group I post-operatively without instilled Dexamethasone

Serial No.	Category	Early Postural Change n=50	Early Mobilization n=50	Oral Intake n=50	Up & Above at Home
1.	Primigravida	25(50%)	18(36%)	22(44%)	45(90%)
2.	Previous 1 C section	20(40%)	20(40%)	18(36%)	46(92%)
3.	Previous 2 C section	18(36%)	19(38%)	25(50%)	42(84%)
4.	Previous 3 C section	18(36%)	22(44%)	25(50%)	44(88%)

Table IV: Well-being of group II patients post-operatively with instilled Dexamethasone

Serial No.	Category	Early Postural Change n=50	Early Mobilization n=50	Oral Intake n=50	Up & Above at Home
1.	Primigravida	32(64%)	38(76%)	28(56%)	45(90%)
2.	Previous 1 C section	34(68%)	36(72%)	30(60%)	43(86%)
3.	Previous 2 C section	38(72%)	33(66%)	32(64%)	44(88%)
4.	Previous 3 C section	30(60%)	34(68%)	28(56%)	43(86%)

of patients, and oral intake resumed in 56–64%.

Follow-up:

- In **Group I**, 90% of primigravida, 92% with one previous section, and 84–88% of those with two or three previous caesarean sections reported being well at home.
- In **Group II,** these rates were higher: 95% of primigravida, 86% with one previous section, 88% with two, and 86% with three caesarean sections were comfortable and well at home.

DISCUSSION

Our study demonstrated a marked difference in morbidity between patients who did not receive intra-peritoneal dexamethasone and patients who received intra-peritoneal dexamethasone.

Menzies D. emphasized that the best method to prevent adhesions in the future is meticulous surgical technique, though pharmacological agents may also reduce adhesion formation by limiting fibroblast and fibrin deposition.[13] Our study supports this concept, demonstrating that dexamethasone, a widely available and inexpensive pharmacological agent, can be effective in reducing morbidity by attenuating adhesion formation.

Diamond M.P. and Freeman M.L. also emphasized in their study that the clinical implications of post-surgical adhesions should be addressed effectively.[14] They concluded that meticulous surgical techniques remain central to adhesion prevention but highlighted the value of pharmacological adjuncts. They noted that adhesions contribute to increased morbidity and delayed wound recovery.

Similarly, Höckel M. et al. conducted a study in rats and observed that intraperitoneal adhesions decreased with sustained intraperitoneal dexamethasone delivered by a novel therapeutic system. In their study, dexamethasone was sprayed into the peritoneal cavity, and a subsequent second-look laparotomy demonstrated fewer adhesions in the treatment group.[15]

Our results are also comparable to those of Greene A.K. et al., who used the anti-angiogenic COX-2 inhibitor celecoxib intra-operatively and observed reduced post-operative morbidity. They concluded that pain, nausea, and vomiting were significantly decreased in the celecoxib group, leading to earlier recovery.[16]

Rodgers K.E. et al. similarly reported a reduction in adhesion formation with the intraperitoneal administration of various anti-inflammatory agents. They observed reduced pain perception and reduced adhesion intensity, consistent with our findings using

dexamethasone.[17]

Orita H., Girgis W., and Dizerega G.S. also showed prevention of post-surgical peritoneal adhesion formation in rabbits by intraperitoneal ibuprofen instillation. They reported markedly reduced adhesion formation and morbidity in the treatment group, further supporting the potential role of intraperitoneal anti-inflammatory agents.[18]

More recent studies also align closely with our findings. Vandana et al. reported that intra-peritoneal dexamethasone with bupivacaine reduced pain in laparoscopic surgery.[19] Our study similarly demonstrated significant reductions in pain scores after caesarean section, indicating that dexamethasone's analgesic effect is robust across different types of intra-abdominal procedures.

Alkatout et al. and Tanigaki et al. evaluated barrier agents such as 4DryField® PH and other pharmacologic adjuncts for adhesion prevention, reporting improved post-operative recovery and fewer adhesions.[20,21] Compared with these novel but often costly interventions, our study demonstrates that dexamethasone offers a low-cost, widely available option with similar benefits.

Taken together, our findings are consistent with both older experimental work and more recent clinical studies, reinforcing the role of pharmacological interventions in adhesion prevention and morbidity reduction. Our study contributes unique clinical evidence from a large obstetric cohort, supporting intra-peritoneal dexamethasone as a simple, inexpensive, and effective strategy for improving post-operative outcomes in caesarean section patients.

CONCLUSION

Intra-operative intra-peritoneal instillation of dexamethasone significantly reduced post-operative pain, facilitated earlier mobilization and oral intake, and improved overall patient well-being. Follow-up data also suggested reduced adhesion-related morbidity.

Conflicts of Interest: None

Funding Sources: None

Ethical Statement: Prior to initiating the study, ethical approval was obtained from the Institutional Review Committee.

Authors Contribution

Tehreem Yazdani: Conception of study / Designing / Planning, Experimentation / Study Conduction, Facilitated for Reagents / Material Analysis

Shazia Awan: Critical Review

Fareeha Zaheer: Analysis / Interpretation / Discussion

Muhammad Saad Mukhtar: Analysis / Interpretation / Discussion, Manuscript Writing

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