Comparative Analysis of Modified MISGAV Ladach and Conventional Caesarean Section

Ghazala Mahmud*
Fozia Rafiq**
Arfa Tabassum****
Nasira Tasnim*

**Professor*
***Senior Registrar*
****Assistant Professor*

Department of Obstetrics & Gynecology, Mother & Child Health Centre, Pakistan Institute of Medical Sciences, Islamabad

Objective: To compare the advantages of the Modified Misgav Ladach caesarean section with conventional caesarean section.

Study design: Quasi- experimental study

Place and duration of study: Mother and Child Health Centre, Pakistan Institute of Medical Sciences, Islamabad, from1st January 2004 to 31st December 2007.

Materials and Methods: 100 patients (50 in each group) undergoing first cesarean section at 37 weeks and above were included in the study. The exclusion criteria was previous caesarean section, previous major abdominal surgeries, uterine rupture, diabetes mellitus, past history of postpartum hemorrhage, endometriosis, bleeding disorder, severe anemia, and intrapartum febrile illness.

Results: The mean operating time was 32.46 minutes for modified misgav ladach versus 52.76 minutes for conventional procedure (P = 0.000). The mean number of sutures used was 3.5 versus 4.8 (P = 0.000), mean period of mobilization since operation was 15.70 hours versus 19.78 hours (P = 0.000), mean hemoglobin loss was 0.762 g/dl versus 1.126g/dl (P = 0.024) respectively. No difference was found in hematocrit loss, postoperative hospital stay and wound infections.

Conclusion: The Modified Misgav Ladach cesarean section confers benefits such as reduced hemoglobin loss, conservation of time, suture materials, and rapid mobilization. The Modified Misgav Ladach technique of cesarean section is a step ahead of refinements in evolution of cesarean section.

Keywords: Cesarean delivery. Cesarean section. Abdominal delivery.

Address for Correspondence
Dr. Arfa Tabassum
Assistant Professor
Department of Obstetrics & Gynecology, Mother & Child Health Centre, Pakistan
Institute of Medical Sciences, Islamabad.
E-mail: shozabshafiq@gmail.com

Introduction

Caesarean section is the most commonly performed obstetric operation in the world. Caesarean section births form one fourth of all deliveries in many countries. WHO recommends that Caesarean section rate should be in the range of 10 –15 % for attaining the best maternal and fetal outcome.[1,2] Caesarean section rate of teaching hospitals of Pakistan is 21.48 % ranging between 13 -50 %.[3]

Safety and cost remain the main areas of concern. Prophylactic antibiotics and improved surgical techniques aiming at reduced operating time and blood loss, have contributed to the safety of this operation over the years.[4] However, there are still disadvantages of the operation and these should be borne in mind by both the mothers and professionals. The rate has increased rapidly and deserves attention.

The conventional Caesarean section has been used over the years. The basic features of conventional Caesarean section include lower subumbilical transverse pfannenstiel incision, spontaneous expulsion of placenta, two layer closure of uterotomy without exteriorization of uterus, visceral and parietal peritoneum closure, continuous closure of sub cutis layer if 2 cm or more in thickness and skin closure in subcuticular stitch.[5]

The method of Caesarean section has remained essentially the same over the years, although a few refinements have been made. One of the methods adopted is Misgav Ladach Caesarean section which was originated in Misgav Ladach General Hospital, Jerusalem, by Dr. M. Stark and was first presented at the XIV World Congress of Gynecology & Obstetrics in Montreal, 1994.[6]

The Modified Misgav Ladach cesarean section is based on the principles of surgical minimalism and working in harmony with the body's anatomy and physiology. This procedure is easy to learn and quick to perform. It is suitable for both planned and emergency operations.

Drawback of the study was that the size of the study was not enough power to the difference in the frequency of wound infections or other maternal morbidity during cesarean delivery using the described technique, as the rate of maternal morbidity was low in both the groups. Another drawback of the study was that we could not do postoperative long-term follow up of the patients and did

not get the opportunity of seeing these patients in subsequent pregnancy for trial of labor and to assess the integrity of scar as the uterus was closed in single layer. Moreover, in case of subsequent cesarean section for the intra abdominal adhesions and again the integrity of scar objectively. The importance of follow up cannot be denied for this kind of operation. Long term follow up after Modified Misgav Ladach cesarean section is necessary for full appreciation of the merits and demerits.

Over the years, various modifications are being tried over even in Misgav Ladach method to improve the Caesarean section. Some of the modifications are lower transverse incision of cutis, spontaneous placental removal, & non exteriorization of uterus for repair which still needs to be studied due to their obvious benefits. In this study, we are using these modifications to modify the Misgav Ladach Cesarean section to evaluate their benefits.

Materials and Methods

The one year study was carried out at Mother and Child Health Center, Pakistan Institute of Medical Sciences, Islamabad from 1st January to 31st December 2007. It was a prospective quasi-experimental study. A total number of 100 cases (50 in each group) who fulfilled the study criteria were included. All the patients who were undergoing their first cesarean section either elective or emergency were included in this study. All patients with previous Caesarean section, previous major abdominal surgeries (excluding appendectomy or lesser procedures), uterine rupture, diabetes mellitus, past history of post-partum hemorrhage, endometriosis, bleeding disorder, severe anemia (less than 7 grams/deciliters), intrapartum febrile illness (more than 39 centigrade) were excluded from the study. The main outcome variables were operation time (minutes), estimated blood loss (hemoglobin and hematocrit drop), number of sutures used, mobilization since operation (hours), wound infection (post operative).The Modified Misgav Ladach was a new technique for all the surgeons (This variable was analyzed during results whether this was comparable in two groups). The standard techniques of both methods were demonstrated at the beginning of study to all the surgeons.

The conventional Caesarean section technique used in the study included the following steps. A pfannensteil incision was given by incising the skin two fingers breadth above pubic symphysis. The subcuticular fat was opened using sharp incision. Sharp incision was given in rectus sheath of approximately 15 cm using the first held with artery forceps at the junction of upper and mid third of the wound and small incision was first made and then further extended under direct vision (Figure 1).

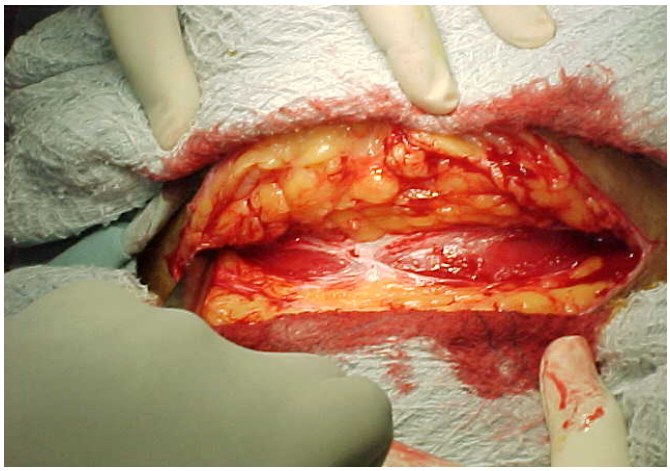

Figure 1: Sharp incision of rectus sheath in conventional cesarean section.

After placing the retractor, visceral peritoneum was held with dissecting forceps and making a small incision using the scissors was extended sharply. The uterus was opened sharply by first giving incision using the scalpel and then extended it by scissors. After removing the baby, placenta was removed by cord traction spontaneously. The uterotomy was closed in double layers. Closure of both peritoneal layers was done. The muscles were approximated by one or two stitches. The rectus sheath and sub cutis were closed by continuous sutures. The skin was closed by subcuticular suture.

The Modified Misgav Ladach procedure adopted for the study included the following steps. To open the cutis only, modified Joel Cohen incision was given as at the level pfannensteil incision. However, at centre which contained no big blood vessels, the cut was made deeper to reach the fascia and subcuticular fat was further parted by blunt method. The fascia was cut with scalpel for 2 to 3 cm & then further extended by using index fingers of both hands (Figure 2). Making room through recti manually, peritoneum was reached. It was cut transversely to open it & stretched in caudal cranial direction to extend it laterally. Visceral peritoneum over lower uterine segment was cut transversely with tip of blade & incision was made deeper into uterus or it was opened at a lower level by pushing the bladder with index finger where required. After baby delivery, placenta was removed cord traction spontaneously. The uterus was not exteriorized. The uterotomy was closed in single layer. The peritoneal layers were not stitched, and muscles were not approximated. The rectus sheath was closed using continuous sutures. Sub cutis was closed with widely spaced stitches. Skin was closed using subcuticular sutures.

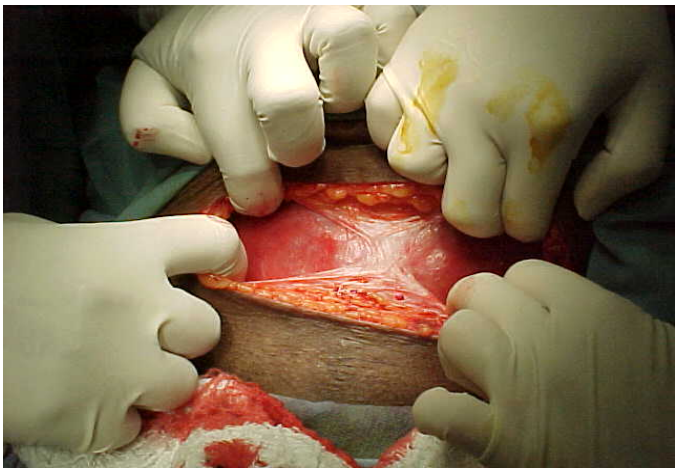

Figure 2: Blunt incision of rectus sheath in Modified Misgav Ladach cesarean section

After the operation, Foley catheter was retained for six hours. Patient was given augmentin 1 gm 12 hourly intravenous and was at least given for 24 hours and then changed to oral antibiotics. Patient was advised to have oral sips in six to eight hours and asked to mobilize, and take care of wound. Complete blood count and urinalysis was carried out on second post operative day. Patient was usually allowed home on fourth or fifth day. Patient was followed up in out patient department after one week.

Data collection was done on a pre designed proforma by the senior surgeon. Data were entered and analyzed by using the SPSS version 11.0 software. The descriptive analysis was done and reported as mean, standard deviation, median for continuous variables such as age, gestation, weight, preoperative hemoglobin and pre-operative hematocrit. The frequencies and percentages were reported for categorical variables such as parity, level of surgeons, type of caesarean and types of anaesthesia. The maternal demographic characteristics between the two groups were analysed by using the Chi- square test for categorical variables like parity and Student t-test for continuous variables such as age, gestation weight. The outcomes such as hemoglobin loss, hematocrit loss and hospital stay between the two groups were also compared by using the Student t-test. For the purpose of analysis we recoded the continuous variables like hemoglobin loss, hematocrit loss and hospital stay into categorical variables. The Chi-square test was used for their comparison. Only 2-tailed p-values were reported for the comparison. Statistical significance was taken at the 5% level.

Results

The baseline variables were successfully matched to rule out the confounding factors and comprised of age, maternal weight, gestation, preoperative hemoglobin (Hb), and preoperative hematocrit (Hct). Parity, level of surgeons, type of cesarean section, and anesthesia also matched successfully. The mean age (years) in Modified Misgav Ladach cesarean section (MML) group was 25.3± 4.8 vs. 26.3 ± 4.9 in conventional cesarean section (CCS) group (P=0.29). The mean weight (Kgs) in MML group was 67.1± 12.0 vs. 64.0 ± 9.1 in CCs group (P=0.15). The gestational age (weeks) in MML group was 39.2± 1.5 vs. 38.6 ± 1.5 in CCS group (P=0.05). The preoperative Hb (g/dl) in MML group was 10.6 ± 1.3 vs. 10.9 ± 1.1 in CCS group (P=0.30). The preoperative Hct (%) in MML group was 33.5 ± 3.4 vs. 33.6 ± 2.9 in CCs group (P=0.94). In MML group, 70% patients were nulliparous and 30% were multiparous whereas, in CCS group, 52% were nulliparous and 24& were multiparous (P=0.06). In MML group, second year level surgeon were 70% and third year level surgeon were 30% whereas, in CCs group second year level surgeon were 58% and third year level surgeon were 42% (P=0.21).

In MML, 80% patients had emergency and 20% patients had elective procedures whereas in CCS 76% patients had emergency and 24% patients had elective procedures (p=0.62). In MML group, 8% patients had general anesthesia and 92% had spinal anesthesia whereas in CCS group, 3% patient had general anesthesia and 97% had spinal anesthesia (p=0.69). In MML group, 80% patients were in 1st stage of labor and 4% patients were in 2nd stage of labor. In CCS group, 58% patients were in 1st stage of labor, and 2% patient was in 2nd stage of labor. There were different indications for cesarean sections in both the groups that were categorized into three major groups i.e. dystocia, fetal distress, and others. Indications for cesarean section matched successfully in both the groups (P=0.55).

The mean operative time in MML group was 35.6 ± 6.0 min. vs. 54.5 ± 7.6 in CCS group (P=0.001) (Table I). The mean number of sutures used in MML group was 3.4 ± 0.4 vs.5.1 ± 0.5 in CCS group (P=0.001) (Table II). The period of mobilization since operation was 14.2 hours ± 3.9 vs. 19.6 hours ± 4.3 (P=0.001).

Table I: Comparison of operative time of all patients in two groups (n = 100)

Operative time (minutes)	**MML-LSCS* Group** (n = 50)	**C-LSCS** Group** (n = 50)	**p-value**
Mean (SD) Median (IQR+)	35.4 (± 6.0) 36.0 (30.0 – 40.0)	54.5 (± 7.6) 54.5 (49.2 – 60.0)	0.001

Table II: Comparison of number of sutures used in all patients in two groups (n = 100)

Number of sutures used	**MML-LSCS* Group** (n = 50)	**C-LSCS** Group** (n = 50)	**p-value**
Mean (SD) Median (IQR+)	3.4 (± 0.4) 3.0 (3.0 – 4.0)	5.1 (± 0.5) 5.0 (5.0 – 5.0)	0.001

Both the groups were similar in view of baby sex, baby weight, and Apgar scores at 5 minutes. In MML group, 42% female babies and 58% male babies were born whereas in CCS group 54% female babies and 46% male babies were born. The mean baby weight in MML group was 2.960 kg ± 0.625 vs. 2.896 kg ± 0.582 in CCS group (P=0.597). The Apgar score of less than 7 at 5 minutes in MML group was in 20% babies vs.14% babies in CCS group (P=0.424). 4% babies in each group were shifted to NICU for low birth weights and birth asphyxia.

The mean hemoglobin loss in MML group was 0.7g/dl ± 0.5 vs. 1.8 g/dl ± 1.1 in CCS group (P=0.001) (Table III) and hematocrit loss in MML group was 2.5% ± 1.4 vs. 5.8% ± 3.1 in CCS group (P=0.001).

Table III: Comparison of loss of hemoglobin (g/dl) in all patients in two groups (n = 100)

Loss of hemoglobin (g/dl)	MML-LSCS* Group (n = 50)	C-LSCS** Group (n = 50)	p-value
Mean (SD) Median (IQR+)	0.7 (± 0.5) 0.7 (0.3 – 1.0)	1.8 (± 1.1) 1.8 (0.8 – 2.5)	0.001

**Modified Misgav Ladach Lower Segmental Caesarean Section,*
***Conventional Lower Segmental Caesarean Section,*
+ Inter Quartile Range

The total of 52% complications occurred, 28% in MML groups and 24% in CCS group. There were 6% wound infections in MML group and 4% in CCS group (P=0.646). 14% patients had urinary tract infection in MML group and 12% patients in CCS group (P=0.635). 2% patient had spinal headache in MML group whereas none in CCS group (P=o.5). 6% patients had febrile illness in MML group and 8% in CCS group. 6% patients had change of antibiotics to third generation cephalosporin in MML group while 4% patients in CCS group (P=0.587). The postoperative hospital stay in MML group was 3.9 days ± 1.0 and 4.7 days ± 1.1 in CCS group (P=0.001).

Discussion

The tertiary care hospitals in countries like Pakistan that provide the emergency obstetric care and manage the complications are overcrowded with a lot of work pressure and limited resources. Supplies of material and requirement for emergency are limited and the socioeconomic condition of patients are also poor. The general health of women giving birth makes limitation of blood loss imperative. Blood is in short supply and transfusion is avoided whenever possible due to the risk of lethal infections.[8]

The Modified Misgav Ladach technique shortened the operation time by at least 19 minutes, the post cesarean hemoglobin loss was 0.4 g/dl lower and post cesarean hematocrit loss was 2.3% lower in comparison to the conventional cesarean section. The Modified Misgav Ladach cesarean section also showed the reduced the number of sutures used by at least 1 suture. Mobilization period post cesarean was reduced by 5 hours on average. However, no difference was found in term of postoperative hospital stay, and wound infections.

The basic features of Modified Misgav Ladach cesarean section include a modified Joel Cohen incision which is placed at the same level of pfannenstiel incision, manual opening of abdomen and uterus, spontaneous removal of placenta, non-exteriorization of the uterus, suturing the hysterotomy in one layer, non-closure of visceral and parietal peritoneum, and recti muscles are not approximated. Rectus sheath, sub cutis and skin are closed. [8, 9]

The Pfannenstiel incision is the method of choice to open the skin due to its cosmetic appeal. Therefore, in our study the Joel Cohen incision was modified in such a way so that women could feel satisfied about the wound site. Finan et al[10] showed that the delivery time is shortened and is less difficult if an Allis clamp fits between retractors, regardless of the direction of the incision and the presenting part.

8% of caesarean deliveries are accompanied by blood loss in excess of 1500 milliliters and/ or a drop in the hematocrit of 10%. In caesarean delivery, sharply expanding the uterine incision significantly increases intra operative blood loss and the need for subsequent transfusion.[11] In our study the abdominal layers and uterus was opened manually to reduce the blood loss which was significantly reduced in Modified Misgav Ladach cesarean group in terms of post cesarean hemoglobin levels.

Though the placenta was removed manually in the Misgav Ladach cesarean section but due to the benefits of spontaneous removal of placenta our series was modified in terms spontaneous removal of placenta. Reduction in blood loss has been reported when delivering the placenta spontaneously with gentle traction on the umbilical cord compared with manual extraction[12, 13]. Atkinson et al [14, 15] found a significantly greater risk of postcaesarean endometritis when delivering the placenta manually rather than spontaneously. Spontaneous placental removal reduces blood loss and post caesarean endometritis.[16]

Exteriorization of uterus is controversial as exteriorization of uterus at section for uterotomy repair is associated with less blood loss but it also increases vomiting, retching pain and risk of venous and air embolism.[16 - 19] Pain score were significantly higher in exteriorization of uterus 3 days post operatively. Uterus exteriorization at section has similar effects to conventional method on perioperative caesarean section morbidity.[20] Whether the uterus is repaired in situ or exteriorized does not affect blood loss, according

to Magann et al.[13] In our study, we modified the Misgav Ladach cesarean section to the non exteriorization of uterus for the closure of uterus to avoid its complications.

Continuous non locking, single layer closure of the uterus is not only expedient but also promises a safe post operative course.[21] One layer with continuous suturing of the uterotomy compared with two layer closure was shown by Hauth et al[22] to reduce operating time. Chapman et al[23] reported that the type of closure (one-or two layer) does not significantly affect the outcome of the next pregnancy. No difference was found in length of labour, mode of delivery or incidence of uterine scar dehiscence, chorioamnionitis, postpartum endometritis, hemorrhage, transfusion and abnormal placentation. Nonclosure of the peritoneum has been shown to reduce post-operative febrile morbidity and wound infection and shorten hospital stay.[24 - 27] Closure of peritoneum at lower segment caesarean section does not offer any additional advantage, rather is associated with more complications. Closure of the peritoneum should be abandoned at caesarean section[28], and there are some suggestions that it might cause more adhesion formation.[29, 30]

The reduction in operating time, blood loss and use of suture material may be findings of major importance to developing country settings**.** On average, their average operating time was 33 minutes. Less time spent in the theatre implies more time available to prevent disasters in the labour ward of a busy unit.

Exact estimation of blood loss in surgical procedures is difficult. Therefore, we estimated the post cesarean hemoglobin loss and hematocrit loss. Less blood loss [31] implies reduced blood transfusions and iron replacements which are not without reactions. Reduction in blood loss has been shown by Darj et al[32] reported average bleeding with Misgav Ladach procedure was 448ml and that with the pfannenstiel procedure was 608 ml (95% CI-290.2;-30). However, spontaneous delivery of the placenta has been reported to reduce post-operative endometritis[12 - 14], which is extremely important in a developing country setting and is adapted in our study.

The reduction in use of suture material provides economic advantages. A shortening of operation times also confers economic benefits, as does reduced bleeding with less need for gauzes and packs.

No difference was found in overall post-operative infection rates. It has been shown that antibiotics given intra-operatively in emergency caesarean sections substantially reduce the risk of post-operative infection. Hagglund et al[33] randomized 160 emergency caesarean section to prophylactic antibiotics (cefuroxim 1.5 g. i.e. with a 6 hour interval) and placebo, reporting 2/80 cases of wound infection or endometritis in the treatment group (2.5%) and 23/80 cases in the placebo group (29%). In the present study augmentin was used for intra-operative prophylaxis and treatment**.**

Mobilization was substantially earlier with the modified Misgav Ladach method, which was expected since it is designed to minimize trauma. Rapid mobilization may be the only means of counteracting thromboembolic disease in poor settings, even in high risk cases.

Conclusion

We recommend the Modified Misgav Ladach cesarean section as it confers benefits in terms of reduced blood loss, lesser operating time, lesser suture materials, and rapid mobilization leading to reduction of economic and manpower burden. The Modified Misgav Ladach technique of cesarean section proves to be a step ahead of refinements in evolution of cesarean section.

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