Laparoscopic surgeries during second and third trimesters of pregnancy in a tertiary care centre in South India: Anaesthetic implications and long-term effects on children

INTRODUCTION

Recent literature reports successful attempts of laparoscopic surgery in pregnancy.[1] We report our experience with anaesthesia for laparoscopic surgeries during the second and third trimesters of pregnancy. Evidences from limited number of studies available on long-term effects on babies are encouraging.

METHODS

All patients who underwent laparoscopic surgeries during the second and third trimesters of pregnancy between January 2000 and January 2011 were included in this retrospective analysis after institutional review board approval. Medical records were reviewed for pre-operative patient profile, intraoperative parameters and obstetric outcome [Tables 1 and 2]. Babies were assessed yearly by Denver developmental screening test II (DDST II).

RESULTS

Eight pregnant patients underwent laparoscopic surgery during the study period. The mean gestational age and the mean age of the patients were 20.75 ± 6.5 weeks and 27.25 ± 4.77 years respectively. All, except three patients were categorised as American Society of Anaesthesiologist physical status 1. Foetal well-being was assessed by pre- and post-operative ultrasound. All patients received prophylactic intravenous isoxsuprine infusion as per institutional protocol. General anaesthesia was administered by rapid sequence induction using propofol/thiopentone and succinylcholine along with fentanyl/morphine/pethidine and intravenous midazolam. Halothane was used in one patient while the rest received isoflurane. Nitrous oxide was used in all patients. Two patients were positioned in the left lateral decubitus and the rest as per the surgical requirement, but with wedge under right gluteus [Table 1]. Open Hasson's technique was used to induce pneumoperitoneum while Verre's needle was used in two patients. Pneumoperitoneum was achieved with carbon dioxide with intra-abdominal pressures maintained below 15 mmHg and end-tidal carbon dioxide ($ETCO_2$) between 28 and 32 mmHg [Table 1]. All surgeries could be completed by laparoscopy except pyeloplasty, which was managed with double J stenting due to inadequate working space. Mean operative time was 116.62 ± 75.80 min [Table 1]. Electrocardiogram, non-invasive blood pressures, oxygen saturation

Table 1: Patient profile and intraoperative parameters

Patient no.	EGA (weeks)	Age (years)/ weight(Kg)	Non-obstetric ultrasound	Laparoscopic surgery	Duration of surgery (min)	Position	Maximum IAP (mm Hg)	Port insertion
1	32	28/55	No findings	Laparoscopic appendicectomy	60	Left lateral decubitus	10	Open Hassons
2	16	33/58	Twisted biloculated ovarian cyst (L)	Laparoscopic cystectomy	60	Wedge under right buttock, Trendelenburg for short period	15	Veres needle
3	20	30/60	Calculus cholecystitis	Laparoscopic cholecystectomy	60	Wedge, reverse Trendelenburg, right up	12	Open Hassons
4	14	21/70	No findings	Laparoscopic appendicectomy	70	Wedge under R buttock, Trendelenburg for short period	12	Open Hassons
5	14	19/65	Right hydronephrosis with PUJ stenosis	Laparoscopic pyeloplasty	30	Left lateral decubitus	12	Open Hassons
6	28	30/76	A well-defined cystic mass with internal echo on the right side outside the uterus	Laparoscopic R salpingo-oophorectomy	105	Wedge under right buttock, Trendelenburg for short period	15	Veres needle
7	22	29/70	Acute calculus cholecystitis	Laparoscopic cholecystectomy	60	Wedge, reverse Trendelenburg, right up	12	Open Hassons
8	20	28/60	EHPVO, moderate splenomegaly	Laparoscopic Splenectomy	270	Left hemilateral	12	Open Hassons

EHPVO – Extra hepatic portal vein obstruction; PUJ – Pelviuretheral junction; EGA – Estimated gestational age; IAP – Intraabdominal pressures

Table 2: Pregnancy and peri-operative details

Patient no.	Perinatal complication	Gestational age at delivery (weeks)	Birth weight (kg)	Apgar at one and 5 min	Discharge (in number of days)	DVT prophylaxis
1	Nil	38, FTND	2.8	9/9	6	Compression stockings, early ambulation
2	Nil	39 full term forceps delivery	3	9/9	6	Compression stockings, early ambulation
3	Nil	39 FTND	3	8/9	3	Compression stockings, early ambulation
4	Nil	38 FTCS	2.9	10/10	3	Compression stockings, early ambulation
5	Nil	39 FTND	2.6	9/9	4	Compression stockings, early ambulation
6	Nil	37 LSCS	3.375	9/10	6	Compression stockings, early ambulation, LMWH
7	Nil	38 FTCS	3.25	10/10	6	Compression stockings, early ambulation, LMWH
8	Nil	38 FTCS	2.46	9/9	8	Compression stockings, early ambulation, LMWH

FTND – Full term normal delivery; FTCS – Full term caesarean section; DVT – Deep vein thrombosis; LMWH – Low molecular weight heparin

and $ETCO_2$ were monitored in all and foetal Doppler performed in two patients. Haemodynamic parameters were maintained within 30% of the baseline values. Patients had compression stockings, early ambulation or pharmacological deep vein thrombosis (DVT) prophylaxis and tramadol/paracetamol analgesia. All patients had an uneventful post-operative recovery. The gestational age at delivery was greater than or equal to 37 weeks in all (mean 38.25 ± 0.71 weeks). Apgar Scores and birth weight of babies were optimal, none required neonatal intensive care. Patients were discharged from the hospital at mean of 5.25 ± 1.75 days post-delivery with an uneventful postpartum period [Table 2]. Follow up of the babies, as evaluated retrospectively from paediatric charts was done yearly by Denver Developmental Screening Test II (DDST II) until five years of age. Few younger babies continue to be assessed.

DISCUSSION

Surgeons were initially reluctant to perform laparoscopic surgeries during pregnancy but technical refinements in laparoscopy have led to a change in approach.[1,2] The reported major benefits of laparoscopy include lesser uterine manipulation, wide and adequate exposure of surgical field with lesser adverse obstetric events and lesser analgesic requirement along with early ambulation.[1,2] The major concerns of laparoscopy during pregnancy include iatrogenic insult to the gravid uterus, preterm delivery, foetal loss, abortion and maternal haemodynamic changes leading to decreased uterine blood flow and foetal asphyxia due to increased intra-abdominal pressures, maternal and foetal acidosis due to systemic carbon dioxide absorption apart from the risk of maternal mortality.[2-4] These

risks may be obviated by a low intra-abdominal pressure (<15 mmHg) and a shortened duration of pneumoperitoneum, this evidenced by the tolerance of the gravid uterus to spontaneous contractions occurring during coughing and straining.[1,2,5,6] The operating time needs to be less than 60 min as in our series, though one case lasted 270 min, highlighting the significance of performing such procedures in centres where sound surgical expertise is available.[2,3] The Society of American Gastrointestinal and endoscopic surgeons (SAGES) recommends monitoring and maintenance of $ETCO_2$ at 28-32 mmHg which was followed in our unit too. All anaesthetic concerns for non-obstetric surgery during pregnancy are applicable.[7] Acid aspiration prophylaxis and adequate pre-oxygenation was given and ketamine was avoided as it may increase uterine tone with risks of foetal asphyxia in the first two trimesters. Thiopentone, propofol, single dose benzodiazepine, most muscle relaxants and inhalational agents are safe. Nitrous oxide was used safely in 50:50 ratio as teratogenic effects have not yet been proven in humans.[7] Morphine, pethidine and fentanyl can prevent stress due to inadequate analgesia. Non-steroidal anti-inflammatory drugs may be avoided in third trimester as they may cause premature closure of ductus arteriosus.

Discussion with surgeon helps in optimal patient positioning and avoids decubitus related complications. Supine decubitus results in aortocaval compression and should be avoided. Left lateral decubitus is ideal as was performed in two patients[1] [Figure 1]. Left lateral tilt (20-30°) and placement of wedge also helped.[2] Trendelenburg decubitus for limited duration is well tolerated.[8]

Both Verre's needle and the open Hasson's technique can be used for establishing pneumoperitoneum.[1,2] Pneumatic compression stockings, though recommended is not universally available hence early ambulation along with heparin/ low molecular weight heparin prophylaxis may be tried.

SAGES recommendations argues against undue surgical delay for obstetric consultation while American Congress of Obstetricians and Gynaecologists recommends prior consultation for all types of non-obstetric surgeries during pregnancy.[1,9] Prophylactic tocolysis is not recommended as it cannot prevent pre-term

Figure 1: Lateral decubitus position is preferred and the port insertion site

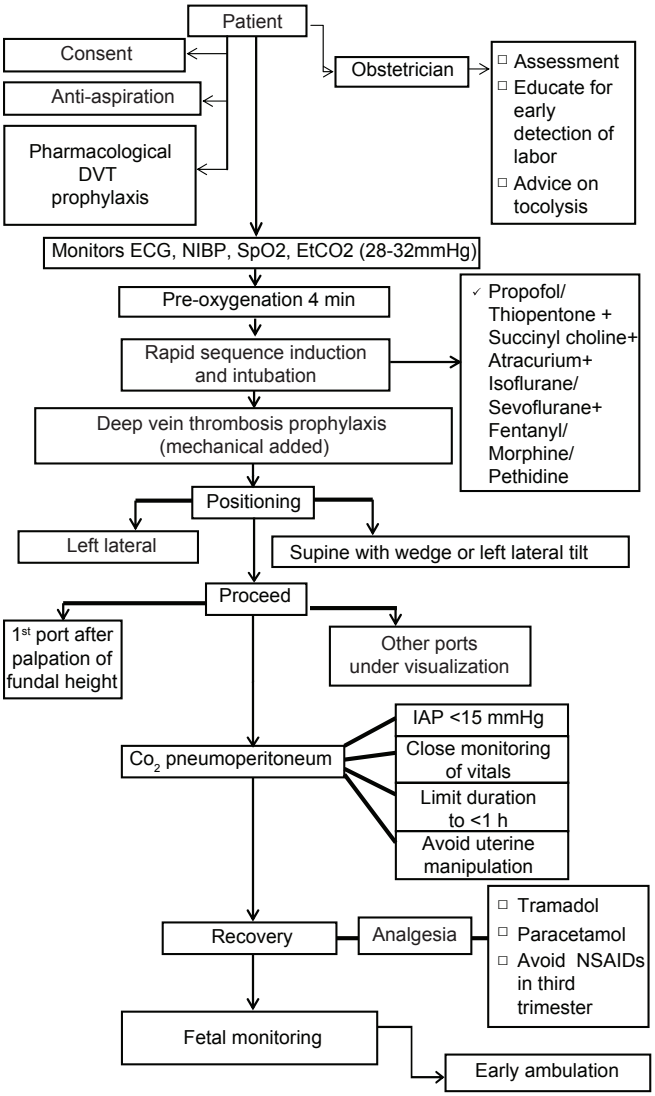

Figure 2: Perioperative management of laparoscopic surgery in Pregnancy-protocol in our institution

labour and may have adverse events.[1] We left this decision to our obstetrician. Pre- and post-operative

foetal monitoring is crucial, while intraoperative monitoring is no longer recommended.[1,2] These surgeries should be performed in well-equipped centres due to the potential for complications. We recommend pharmacological DVT prophylaxis and obstetric backup. The protocol practiced in our centre is shown in Figure 2.

Limited studies on long-term foetal effects have reported no adverse events.[10] DDST II assessed yearly in our children up to 5-years-revealed no abnormalities until now.

Limitations of our study are that it is a retrospective analysis with only eight patients, with no control arm for mothers and babies and further assessment of babies is ongoing and not complete yet.

CONCLUSION

Laparoscopic surgeries during pregnancy may be a viable alternative to open surgery provided it is performed in centres with multidisciplinary facilities and recommendations are followed.

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