

Laparoscopic Gynecologic Surgery Under Regional Neuraxial Anaesthesia: the beginning of a new era?

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1. Abstract

1.1. Background and Objectives: At present, most laparoscopic interventions are performed under general anesthesia. In literature we have few retrospective studies, with few cases, that show just minor laparoscopic procedures performed under regional anesthesia.

Our study tried to assess the feasibility of almost all types of gynecologic laparoscopies under regional neuraxial anaesthesia.

1.2. Methods: In this retrospective case series we collected several consecutive cases of women undergoing different gynecologic laparoscopic interventions such as adnexectomies, enucleation of ovarian cysts, multiple myomectomies, total hysterectomies, radical hysterectomies with sentinel lymph node biopsy, complete excision of endometriosis and adhesiolysis using regional anaesthesia. All the surgeries were performed at the Donatello Clinic in Florence (Italy), between October 2019 and April 2022.

1.3. Results: A total of 43 patients undergoing surgery met inclusion criteria. Using RA we found: spontaneously breathing patients without the need of manipulations to the airway, no pulmonary complications, excellent muscle relaxation, fast postoperative bowel canalization, few postoperative pain, low postoperative narcotics use and no presence of postoperative nausea and vomiting.

1.4. Conclusions: Almost all gynecologic laparoscopies under regional anaesthesia seem to be feasible and safe in motivated patients, but further research is needed to confirm our encouraging data.

2. Introduction

Laparoscopic procedures, known as ‘minimally invasive’, have advanced noticeably in recent years. [1-2].

The advantages of laparoscopy over open surgery are well known: less postoperative pain and morbidity, less pulmonary complications, rapid recovery and shorter hospital stay [3-4].

Commonly, general anaesthesia (GA) with endotracheal intubation is considered the safest technique for laparoscopic procedures because it seems to prevent aspiration, respiratory distress, discomfort and shoulder pain due to induction of pneumoperitoneum [3-5].

Currently, most laparoscopic operations are performed under GA. The use of regional anaesthesia (RA) in laparoscopic surgery has been limited to patients at high risk for coexisting pathologies, especially pulmonary or cardiac diseases, or it is integrated with GA in order to decrease postoperative pain [3-4].

In general surgery RA has been applied to a few laparoscopic procedures, especially cholecystectomy [6-7]. Moreover there is a little number of studies that describes the use of spinal anaesthesia for laparoscopic inguinal hernia repair [8]. RA offers certain advantages: better muscle relaxation, reduced metabolic responses to surgical stress, none or less pulmonary complications, more rapid postoperative bowel canalization, less postoperative pain, decreased need for narcotics, analgesics and lower incidence of postoperative nausea and vomiting. Nevertheless it is associated

with different hemodynamic changes because of the sympathetic block resulting in vasodilation, hypotension, bradycardia and decreased cardiac output [3-9]. Aortic Valve stenosis is therefore a contraindication to the spinal technique.

Regarding the gynecologic procedures GA is the predominant technique. Data on laparoscopic cholecystectomy are not applicable to major gynecologic surgery because the latter requires a Trendelenburg position which worsens pulmonary compliance and it involves longer operating times. In literature only few studies can be found, mainly case reports, about laparoscopic hysterectomy or laparoscopic surgery for benign adnexal conditions under RA [1-2-3-10].

3. Materials and Methods

All the surgeries were performed at the Donatello Clinic in Florence (Italy).

In this clinic, anesthetists perform most of the interventions under regional anesthesia, including gynecological ones. After three years of collaboration with them, we have collected all gynecological interventions completed in the clinic.

In consideration of our occasional work there, the number of cases collected amounts to 43.

According to anesthetists' method we started all the gynecologic surgeries under regional anesthesia in all women who agreed to perform the intervention under RA and who had no contraindications to the use of this technique.

Indeed women did not have to be endowed with precise selection criteria.

Contraindications to RA included patient's refusal or uncooperative patients, infection at the site of injection, coagulopathy, allergy to local anaesthetics, sepsis, poor pulmonary compliance, gastroparesis, third-class obesity, migraines, spinal deformity, etc.

During preoperative work-up, all patients underwent gynaecological examination. After a detailed counselling about anaesthesia in laparoscopic surgery, an informed written consent was obtained.

In this study we collected all the patients who underwent any gynecologic laparoscopy performed between October 2019 and April 2022 at the Donatello Clinic in Florence by the same anaesthetic and surgical team. In accord with the common practice of the Clinic's anesthetic team, all gynecologic interventions were performed under regional anesthesia, except in cases with contraindications to the use of this technique.

Regarding the anaesthetic technique patients underwent spinal neuraxial anaesthesia alone (one shot) or associated with epidural catheter placement. The spinal puncture was performed at the thoracic level, at the level of (T6-T9) and the epidural catheter, if necessary, was placed between T9 and L1, based on the availability of anatomical landmarks.

The injection of local anaesthetic (hyperbaric bupivacaine 0.5%

and hypo/isobaric levobupivacaine 0.5%) at the thoracic level together with so-called adjuvant pharmacological agents (clonidine which enhances and prolongs the anaesthetic and analgesic effect, causing sedation and sufentanil/morphine which extend and enhance the analgesic effect) allowed to obtain a sensory-motor anaesthesia adequate to the needs of pneumoperitoneum in laparoscopic surgery (with sensitive block extended cranially up to C4/C5).

Mild sedation was used to control patients with high levels of anxiety and agitation.

The use of an epidural catheter, appropriately placed, can allow to manage even longer surgeries with RA.

Concerning the surgical technique pneumoperitoneum was initiated using the Veress Needle. Intra-abdominal pressure was increased up to 20 mmHg to insert the umbilical trocar and was later reduced to 12 mmHg to accommodate accessory trocars, after the placement of the patient in Trendelenburg position (about 25°-30°). All the surgery was performed with a 9 mmHg pressure, to avoid as much as possible any interference with respiratory dynamic.

The following perioperative parameters were recorded for each patient: heart rate, blood pressure, oxygen saturation, use of mild sedation, VAS scale, days of hospitalisation, time of bowel canalization, PONV.

According to Italian legislation, this study not require ethics committee approval for their retrospective nature. Written informed consent was obtained from the patient for the publication of this report.

4. Results

This is a retrospective case series cohort study including minor and major gynaecological surgery.

A total of 43 patients were collected in this study. All women underwent gynecologic laparoscopy under RA.

Baseline characteristics of the patients are summarized in Table 1.

Concerning the type of laparoscopic surgical procedure we collected:

- 11 laparoscopic complete excision of endometriosis
- 10 laparoscopic total hysterectomies (three of them with bilateral salpingectomy and the other with bilateral adnexectomy)
- 2 laparoscopic radical hysterectomies with sentinel lymph node biopsy
- 7 laparoscopic multiple myomectomies (one of them involving the removal of a bladder neof ormation, another associated with hysteroscopic endometrial ablation, another with excision of endometriosis)
- 6 laparoscopic enucleation of ovarian cysts
- 4 laparoscopic bilateral adnexectomies (one involving hystero-

scopic removal of a cervical polyp)

- 3 operative laparoscopy for adhesiolysis (one associated with an hysteroscopic repair of isthmocele and the other one with a Bartholin gland marsupialization surgery)

All the procedures lasted less than 2 hours except two. One of these, a multiple myomectomy, required conversion to GA (without epidural catheter) due to the long duration of the surgery and high level of anxiety.

With this anaesthetic technique it has been possible to obtain a satisfactory and comfortable anaesthesia for the duration of a simple gynaecological operation.

Neuraxial anaesthesia avoided GA and its associated complications: it kept the patient awake or lightly sedated with an immediate recovery of alertness, it allowed early refeeding and mobili-

sation, it no presence of postoperative nausea and vomiting. Light sedation also allows to maintain the cough reflex, reducing the risk of inhalation.

Spontaneous breathing without the need for endotracheal intubation reduced the invasiveness of the anaesthetic phase. The sedation given by the pharmacological adjuvants also allowed an amnesic effect. The postoperative pain was controlled with epidural infusion which allowed to avoid opiate drugs and their side effects and therefore guaranteed a very rapid recovery.

The interventions were uncomplicated and the postoperative courses were uneventful.

Perioperative parameters were always in the normal range.

Table 2 shows surgery/anaesthesia-related perioperative and postoperative events.

Table 1: Characteristics of the patients

MEAN AGE (YEARS)	34.5 (range 22-51, DS \pm 6,630)
AVERAGE BODY MASS INDEX (KG/M ²)	25.1 (range 21-30, DS \pm 2.422)
ASA - CLASSIFICATION (CLASS) [^]	1.7 (range 1-3, DS \pm 0,687)

[^] ASA-classification (class 1–6), according to The American Society of Anesthesiologists (ASA) physical status classification system

Table 2: Perioperative and postoperative parameters recorded for each patient, and number of conversion to GA

	Number of patients = 43
Perioperative	
Neck/shoulder pain	2 (5%)
Hypotension	1 (2%)
Bradycardia	0 (0%)
Tachycardia	1 (2%)
Hypoxemia	0 (0%)
Hyperthermia	1 (2%)
Mild anxiety	6 (14%)
Conversion to GA	1 (2%)
Postoperative	
Abdominal pain (VAS > 5)	2 (5%)
Nausea and Vomiting (PONV)	0 (0%)
Headache	2 (5%)
Urinary retention	0 (0%)
Average time of hospitalisation (days)	1 (range 0-3, DS \pm 0,5766)
Average time for bowel canalisation (days)	1 (range 0-3, DS \pm 0,3881)

5. Discussion

Laparoscopy is a procedure that offers various postoperative benefits: less surgical trauma and pain, less pulmonary dysfunction, quicker recovery, shorter hospital stay. At present, most laparoscopic procedures are performed under GA. The majority of studies about RA in laparoscopic surgery involve laparoscopic cholecystectomy, with few cases of appendectomy and hysterectomy [12-13]. One report from 2015 describes the use of mixed spinal and epidural anaesthesia for 42 patients undergoing laparoscopic cholecystectomy and 8 patients undergoing laparoscopic hyster-

ectomy [12]. Data on laparoscopic cholecystectomy are not applicable to hysterectomy because the former requires a reverse Trendelenburg position, involving a more favourable pulmonary dynamics. The most recent (2018) gynecologic procedure realised under epidural analgesia was one hysterectomy, which was due to patient's preference [1-12].

A prospective cohort study from 2020 compared postoperative pain after laparoscopic adnexal procedures for benign conditions under GA or RA and concludes that RA is a feasible, safe and effective anesthesiologic technique for laparoscopic gynecologic

procedures for benign conditions. It seems to allow a better control of postoperative pain [3].

The bigger concern is the fear that pneumoperitoneum and Trendelenburg's position are not well tolerated by patients awake during the procedure, but our experience was not consistent with this statement [3-14-15].

In accord with Moawad N.S et al. we used an intra-abdominal pressure of 9 mmHg during all the surgery. In literature low pressure insufflation is generally preferred in order to reduce chest discomfort and shoulder pain due to the diaphragmatic irritation caused by pneumoperitoneum [1-2]. Indeed this can contribute to the success of our procedures. It is noticeably that all the patients well tolerated 20 mm Hg pressure at the time of umbelical trocar insertion.

Successful gynecologic laparoscopies under RA depend on appropriate management of pain and anxiety. Preoperatively it would be recommended a discussion of risks and benefits with the patient. Anxiety should be addressed before surgery. In addition the woman has to understand the possibility to convert to GA during surgery [1]

Despite the small number of cases our study demonstrates that almost all types of gynecologic laparoscopies can be potentially done under RA. The only limit imposed is the time of surgery: the intervention should be completed within two hours because beyond this point the choice is to convert to general anaesthesia, unless you have a properly placed epidural catheter.

The mean surgical time of our operations is about two hours. In case of prolonged surgery, the choice to continue under GA was left to the anesthesiologist's judgement, and in one case of the two lasting more than 2 hours additional doses of local anaesthetic and adjuvants through the epidural catheter was performed.

If and when to continue under RA should be a matter of further investigation.

Among our cases only one case required conversion to GA. All the interventions were uncomplicated and the postoperative course was uneventful.

The advantages we found using RA are: excellent muscle relaxation, no pulmonary complications, fast postoperative bowel canalization, few postoperative pain and no presence of postoperative nausea and vomiting.

Our results agree with Raimondo et al, implementing the use of RA, the complications of GA and of endotracheal intubation such as sore throat, muscular pain and eventual airways trauma can be avoided. [3]

6. Conclusion

Any gynecologic laparoscopy under regional anaesthesia seems to be feasible and safe in motivated patients, but further research is needed to confirm our encouraging data. The procedures need to be carefully managed by a skilled surgical team and anaesthesia

care team, with efficient collaboration between the two.

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