Case Report

Challenges in anaesthetic management of ankylosing spondylitis for elective gynaecological oncologic procedures: A Case Report

Varvarousi G[1*], Stamatakis E[1], Pavlidis M[2], Valsamidis D[1]

[1]MD, PhD Anesthesiology

[2]MD Anesthesiology

Department of Anaesthesiology, Obstetric Department, Alexandra Hospital, Athens, Greece.

**Correspondance: Department of Anaesthesiology, Obstetric Department, Alexandra Hospital, Athens, Greece, e-mail: givarvarousi@gmail.com*

ABSTRACT

Challenges in anaesthetic management of ankylosing spondylitis for elective gynaecological oncologic procedures: A case report.

Varvarousi G, Stamatakis E, Pavlidis M, Valsamidis D

Ankylosing spondylitis (AS) is a chronic inflammatory arthritis characterized by progressive ossification of the spinal column with resultant stiffness. Patients, with AS, have a suppressed immune function due to proinflammatory cytokines and chemokines which are responsible for the inflammation of the joint. In AS stress, inflammation responses to surgery and postoperative pain may further suppress immunity function and promote cancer progression.

A 77-year-old woman, ASA III status and with AS for almost 20 years, was planned to receive anaesthesia for total abdominal hysterectomy, pelvic and paraaortic lymph node dissection. Sufficient operating conditions, with adequate depth of anaesthesia, analgesia and neuromuscular blocking, attenuated surgical stress and reduced intraoperative and postoperative inflammatory mediators.

We report the anaesthetic management of a patient with AS undergoing gynaecological cancer surgery. Titration of drugs and adequate monitoring reduced the consumption of drugs and allowed recovery to be shortened with no side effects.

Keywords: anesthesia, ankylosing spondylitis, gynaecological procedures

INTRODUCTION

Ankylosing spondylitis (AS) is a chronic inflammatory arthritis characterized by progressive ossification of the spinal column with resultant stiffness[1]. Patients, with AS, have a sup-

pressed immune function due to proinflammatory cytokines and chemokines which are responsible for the inflammation of the joint. In AS stress, inflammation responses to surgery and postoperative pain may further suppress immunity function and promote cancer progression[2].

Therefore, sufficient operating conditions, with adequate depth of anaesthesia, analgesia and neuromuscular blocking, are important, in AS patients, undergoing gynaecological cancer surgeries in order to attenuate surgical stress and reduce intraoperative and postoperative inflammatory mediators. Implementing multimodal monitoring techniques in general anaesthesia helps to individualize intraoperative drug administration and minimize drug related adverse effects which is conducive to the prognosis of patients with AS[3].

We report the anaesthetic management of a patient with AS undergoing gynaecological cancer surgery. Titration of drugs and adequate monitoring reduced the consumption of drugs and allowed recovery to be shortened with no side effects

CASE REPORT

A 77-year-old woman, weighing 60 kg, with a height of 150 cm, ASA III status and with AS for almost 20 years, was planned to receive anaesthesia for total abdominal hysterectomy, pelvic and paraaortic lymph node dissection at our hospital, which is a referral center for gynaecological cancer. She had a history of ischemic stroke in 2016 for which she received per os aspirin 100 mg, levetiracetam 500 mg and citalopram 20 mg for the last five years regularly. The woman had severe AS with fixed kyphotic deformity of cervical spine, limiting neck movement and was treated with per os naproxen 250 mg twice a day (Image 1). Preoperative assessment of the airway revealed Mallampati classification grade IV, thyromental distance < 6.5 cm and inter-incisor gap of 4 cm.

Image 1. Patient's position during epidural technique.

Thoracolumbar spinal inflammation led to fibrosed interspinous ligaments, with limited intervertebral disc spaces and flattening of the thoracic kyphosis and the lumbar spine. The above resulted in a restrictive syndrome with limited chest expansion and impaired move-

ment of the ribs. Pulmonary function tests revealed severe restrictive lung disease with FVC<80% and FEV1/FVC 95% of predicted values. Parenchymal high resolution computerized tomography showed bilateral diffuse ground glass appearance and honey-comb opacities, especially in the lower lobes. Owing to lung fibrosis, arterial blood gas analysis showed pH: 7.36, pO_2: 60 mmHg, pCO_2: 43 mmHg, SpO2: 94 % (FiO_2:21%), necessitating oxygen preoperatively and bronchodilator therapy. Echocardiography showed moderate pulmonary hypertension, moderate mitral regurgitation and ejection fraction of 55% and she was on amlodipine 100 mg and atenolol 100 mg once daily per os.

Upon arrival in the operating room, all standard monitors, pulse oximetry, electrocardiography and NIBP were applied. The patient was premedicated intravenously with cimetidine 150 mg, midazolam 0.5 mg and fentanyl 25 μg and was placed in sitting position. Intravenous fluid was initiated and sulbactam 3 gr was administered. After cleaning, skin was infiltrated with 1.5% lidocaine. The epidural block was attempted by the para-median approach with 18 g Tuohy needle through T8-9 space, but the space could only be localized in the third attempt. While advancing the epidural catheter, some initial resistance was met at the 10-cm mark. Although there was a loss of resistance in epidural space, we assumed that the opening of Tuohy needle had not penetrated all of the thickness of ligamentun flavum. Therefore, we advanced Tuohy needle only by 0.5 mm in order to overcome the hypertrophied ligamentum flavum. In addition to the above, we injected 3 ml normal saline 0.9% through the epidural needle to open up the narrowed epidural space and used a more rigid catheter contributed to the successful advancement of the epidural catheter. After confirming that, there was no aspiration of blood or cerebrospinal fluid from the epidural catheter, we administered a test dose of 3 ml of 2% lidocaine epidurally. Patient was placed in the Semi-Fowler's position and a large pillow was put under her knees. The table was adjusted to moderate head-down position due to AS (Image 2).

Neuromuscular transmission (NMT) was measured by assessment of the post-tetanic count (PTC), train-of-four count (TOF), and the train-of-four ratio (TOFR) using kinemyography (Datex-Ohmeda® Mechano Sensor NMT device, Datex Ohmeda Inc®, Wisconsin, USA) at the right adductor pollicis muscle. Moreover, spectral entropy monitoring provided quantitative measurement of the depth of anaesthesia (Entropy TM Module (DatexOhmeda®, Helsinki, Finland). Surgical Plethysmographic Index (SPI) monitoring (algorithm that uses two components of the GE® photoplethysmographic signal when measured on GE® SpO_2 finger sensors) provided the patient's hemodynamic responses to surgical stimuli and analgesic medication under general anaesthesia.

Image 2. Patient positioned with pillows to support head and neck.

Patient was preoxygenated for 3 minutes using a tight-fitting face mask while breathing 100% oxygen at a rate of 10 l/min. Propofol 100 mg was intravenously administered and patient underwent initial laryngoscopy with C-MAC D-BLADE video laryngoscope (Karl Storz®, Tuttlingen, Germany) in order to assess her at difficult intubation[4]. Video Laryngoscopy revealed a MCLS (modified Cormack and Lehane score) of I, on the first attempt of laryngoscopy. Anaesthesia was induced with extra 50 mg of propofol, 0.9 mg/kg of rocuronium intravenously and 50 μg of fentanyl intravenously. Upon reaching a T1 value of 0%, the patient was successfully intubated using an endotracheal tube sized 7.0 mm (Image 3).

After securing the airway, general anaesthesia was maintained with air /oxygen (FiO2: 0.5), desflurane and neuromuscular blockade. The patient was mechanically ventilated with pressure control volume guarantee ventilator mode (tidal volume 450 ml, respiratory rate 12 and peep 5 mmHg). Due to the underlying cardiopulmonary disease and advanced age, arterial catheter and right internal jugular vein were cannulated in 14 cm with ultrasound (EZONO® 3000). Neuromuscular blockade was maintained with supplemental doses of rocuronium 0.15 mg/ kg intravenously in order to achieve deep neuromuscular blockade with PTC at 1 to 2 throughout surgery. Desflurane 4,3-5,4% inspired concentration, 1 mg midazolam iv and 30 μg clonidine iv, titrated to achieve entropy values intraoperatively between 40 and 60.

Intra-operative analgesia was maintained by administration of 5 ml of ropivacaine, 0.375% and 1.5 mg of morphine epidurally. Moreover, we administered paracetamol 1 gr and dexketoprofen 50 mg intravenously. At the end of the surgery PTC was 2, therefore 4 mg/kg of sugammadex were intravenously administered to reverse deep NMB. After 5 minutes TOF ra-

tio reached >0.9 and the patient was successfully extubated. The total operative time was 1.5 hours and the patient was administered 1.5 lt of Ringer Lactate and had 280 ml diuresis.

Image 3. CMAC in ankylosing spondylitis

Postoperatively, 0.5 mg of morphine and 5 ml of ropivacaine 0.2% at PACU were administered epidurally. Patient controlled epidural analgesia with bolus dose 6 ml ropivacaine, lockout interval 30 min, and possibility for 3 doses per 2 hours without standard rate were given for 72 hours through the catheter. The patient was followed up postoperatively and no complications were observed.

DISCUSSION

Patients with AS have chronic inflammatory arthritis with increased pro-inflammatory and prooxidative status. Surgical manoeuvres can induce the release of stress hormones, in the absence of sufficient intraoperative anaesthesia, analgesia and neuromuscular blockade. Therefore, adequate titration of anaesthetics, analgesics and neuromuscular blockers is important in order to reduce pro-inflammatory and pro-oxidative effects due to surgery stress. Moreover, it may improve postoperative outcome, reduce mechanical ventilation time and decrease the time of hospitalization.

Thoracic epidural analgesia has shown to be superior to intravenous opioid-based care, in gynaecological surgery. as it improves postoperative pain control, reduces requirements for opioids and minimizes opioid related adverse effects, such as upper airway obstruction and decreased respiratory drive[5]. Moreover, opioids were reported to be related to worse oncological outcomes for cancer surgeries. Various studies have shown that perioperative epidural analgesia improves cancer recurrence and survival, as it attenuates surgical-related stress and immunosuppression[6]. Furthermore, local anaesthetics used in epidural analgesia may directly have anti-metastasis effects and improve immunosuppression via attenuation of postoperative pain[7]. In our study the administration of 5 ml of ropivacaine 0.2% and 1.5 mg of morphine epidurally reduced intraoperative opioid consumption, shortened the arousal time from anaesthesia and facilitated extubation[8]. The adjunctive use of paracetamol, dexketoprofen and clonidine further decreased the requirements for opioids improved the outcome of the patient.

In patients with AS degenerative processes like AS may induce inflammatory changes and contribute to ligamentum flavum hypertrophy, calcification of interspinous ligaments and formation of syndesmophytes. Therefore, the

placement of epidural catheter may be technically difficult. The epidural space is narrowed and there is a lack of interlaminar space for entry. Multiple attempts to advance epidural catheter in AS patients who are treated with NSAIDs may increase the risk of complications such as epidural haematoma. In our study, successful identification of thoracic epidural space, through paramedian approach, was achieved after third attempt. Moreover, it was technically difficult to insert and thread an epidural catheter. The formation of osteophytes, a narrowed epidural space and stiff ligamentum flavum were the contributory causes. In order to aid the insertion of epidural catheter, we advanced Tuohy needle by 0.5 mm and used a more rigid catheter. Thereby we overcame the resistance of the thickened ossified ligamentum flavum. Moreover, we injected saline to open the narrowed epidural space. By applying a less force during insertion of the epidural catheter we avoided migration of the catheter itself in the subdural space and formation of epidural haematoma[9].

In patients with AS undergoing cancer gynaecological procedures, adequate depth of anaesthesia is important in order to establish sufficient operating conditions. Studies have shown that volatile anaesthetics are independent risk factors for cancer recurrence[10]. However, both insufficient and excessive administration of hypnotics and vapours during general anaesthesia can compromise the outcome of the AS patient. In our case quantitative measurement of the depth of anaesthesia with spectral entropy monitoring reduced anaesthetic doses and achieved greater hemodynamic stability. Titration of desflurane, midazolam and clonidine, in order to achieve entropy values during the surgical procedure between 40 and 60, reduced the incidence of intraoperative awareness and achieved shorter emergence and postoperative recovery time.

In gynaecological oncologic procedures, classic tight spaces in the pelvis may make surgical access difficult. Surgical conditions may be improved by changing the body position and ventilator patterns and by increasing the depth of anaesthesia and adequate neuromuscular blockade. However, in AS patient surgical conditions cannot be improved by changing body position due to a fixed body position. Moreover, patients with AS have restrictive disease and lung pathology and changing ventilator patterns may lead to desaturation. Therefore, deep neuromuscular blockade is important, in order to increase substantially visibility and available working space. In our study, deep neuromuscular blockade with a PTC of 1 or 2 intraoperatively and until the end of the surgery provided an important contribution to optimizing the surgical field and improving patient outcomes[11].

Deep neuromuscular blockade until the end of the surgical procedure increases the risk for residual neuromuscular paralysis, which has clinical consequences and complications that can

prolong hospitalization. Patients with AS have decreased forced vital capacity and respiration being diaphragm dependent and, therefore, even a small amount of residual neuromuscular block could result in postoperative mechanical ventilation dependency[12]. Moreover, in AS residual paralysis may result in upper airway collapse, hypoxia and aspiration. In our case report, we maintained deep NBD until the end of the surgery due to the availability of neuromuscular monitoring and reversal agents. Adequate monitorization of NMT prevented residual paralysis postoperatively and reduced postoperative pulmonary complications[13].

Patients with AS have severely decreased cervical spine mobility and increased risk of failed intubation. Various methods have been described concerning the effective management of patient's airway, such as awake fibreoptic bronchoscopic intubation or laryngeal mask airway. Previous studies reported successful intubation with McGrath® (Aircraft Medical Limited, Edin burgh, UK) or Glidescope® (Verathon Medical B.V. Boerhaaveweg, Ijsselstein, The Netherlands) in AS patients[14]. In our study, we assessed the patient at difficult intubation by using C-MAC video laryngoscope. Co-administration of propofol and fentanyl without muscle relaxants facilitated direct laryngoscopy with C-MAC video laryngoscope and revealed a MCLS of I. Patient had a 4 cm mouth opening and a restricted neck movement with an inability to achieve an optimal sniffing position. C-MAC video laryngoscope provided a full indirect view of the glottis without the need for anatomic alignment of the oral, pharyngeal, or tracheal axes, owing to an exaggerated curvature of the D blade. Moreover, the mouth opening was sufficient enough to introduce the D blade to the oral cavity. Studies have shown that although video laryngoscopes can achieve a better laryngeal view, there may be a resistance of advancement of the tracheal tube[15]. In our case report, there was no resistance to the advancement of the tracheal tube and there was no problem in manipulating the tracheal tube through the vocal cords with C-MAC device. To the best of our knowledge, C-MAC video laryngoscope has not been used in patients with AS. C-MAC improved glottis view and increased first attempt intubation success.

CONCLUSION

In patients with AS, optimal management of anaesthesia can facilitate the conduction of surgery and have positive effects on peri- and postoperative outcomes. Adequate monitoring and titration of drugs may modulate the surgical stress, inflammatory and immunological responses after gynaecological cancer surgeries. Moreover, they may improve surgical conditions and decrease the incidence of anaesthesia-related complications by reducing the consumption of drugs.

Addittional materials: No

Acknowledgements: Not applicable

Authors' contributions: VG drafted the paper and is the lead author, SE contributed to planning and the critical revision of the paper, PM contributed to planning and the critical revision of the paper, VD contributed to planning and the critical revision of the paper.

Funding: Not applicable.

Availability of supporting data:

Not applicable.

Ethical approval and consent to participate: No IRB approval required.

Consent for publication: Patient's consent was obtained

Competing interests: Authors declare that they have no competing interests.

Received: June 2023, Accepted: June 2023, Published: June 2023.

REFERENCES

1. Van der Horst-Bruinsma I E, Lems W F, Dijkmans B A C. A systematic comparison of rheumatoid arthritis and ankylosing spondylitis. Clin Exp Rheumatol. 2009;27:S43-9.
2. Cata JP, Bauer M, SokariT, et al. Effects of surgery, general anesthesia and perioperative epidural analgesia on the immune fuction of patients with non small cell lung cancer. J Clin Anesth. 2013;25.255-62.
3. Huepenbecker SP, Cusworth SE, Kuroki LM, et al. Continuous epidural infusion in gynecologic oncology patients undergoing exploratory : the new standard for decreased postoperative pain and opioid use. Gynecol Oncol 2019;153:356-361.
4. Levitan RM, Ochroch EA, Kush S, et al. Assessment of airway visualization: validation of the percentage of glottic opening (POGO) scale. Acad Emerg Med 1998;5:919–23.
5. Moslemi F, Rasooli S, Baybordi A, et al. A comparison of patient controlled epidural analgesia with intravenous patient controlled analgesia for postoperative pain management after major gynecologic oncologic surgeries : a randomized controlled clinical trial. Anesth Pain Med 2015;5:e29540.
6. De Oliveira GS Jr, Ahmad S, Schink JC, et al. Intraoperative Neuraxial Anesthesia But Not Pos toperative Neuraxial Analgesia Is Associated With Increased Relapse-Free Survival in Ovarian Cancer Patients After Primary Cytoreductive Surgery. Reg Anesth Pain Med. 2011;36(3):271-7.
7. Yang J, Li G, Bao K, et al.Ropivacaine inhibits tumor angiogenesis via sodium channel-independent mitochondrial dysfunc-

tion and oxidative stress. J Bioenerg Biomembr ; 2019:51: 231-8.

8. Ledowski T, Burke J, Hruby J. Surgical pleth index: prediction of postoperative pain and influence of arousal. Br J Anaesth 2016; 117: 371–374.
9. Batra YK, Sharma A, Rajeev S. Total spinal anaesthesiafollowing epidural test dose in an ankylosing spondyltic patientwith anticipated difficult airway undergoing total hip replacement. European Journal of Anaesthesiology 2006;23:890–8.
10. Ecimovic P, McHugh B,Murray D, Doran P, Buggy DJ.Effects of sevoflurane on breast cancer cell function . Vitro Anticancer Res ;2013:33:4255-60.
11. Srivastava A, Hunter JM. Reversal of neuromuscular block. Brit J Anaesth. 2009;103:115-129.
12. Eriksson LI et al. Functionnal assessment of the pharynx at rest and during swallowing in partially paralysed humans. Anesthesiology 1997; 87: 1035–43.
13. Grosse-Sundrup M, Henneman JP, Sandberg WS, et al. Intermediate acting non-depolarizing neuromuscular blocking agents and risk of postoperative respiratory complications: prospective propensity score matched cohort study. Brit Med J. 2012;345:e6329.
14. Uslu B, Damgaard Nielsen R, Kristensen BB. McGrath videolaryngoscope for awake tracheal intubation in a patient with severe ankylosing spondylitis. Br J Anaesth 2010;104:118e9.
15. Rai MR, Dering A, Verghese C. The GlideScope system: a clinical assessment of performance. Anaesthesia 2005; 60: 60–4.

Publisher's Note

The publisher remains neutral with regard to jurisdictional claims in published maps and institutional afliations.

Citation Varvarousi G, Stamatakis E, Pavlidis M, Valsamidis D. Challenges in anaesthetic management of ankylosing spondylitis for elective gynaecological oncologic procedures: A case report. *Greek e j Perioper Med. 2023;22(b): 36-44.*