

Case Report

Anaesthetic management of a parturient with Turner syndrome and preeclampsia for cesarean section: A Case Report and Literature Review

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ABSTRACT

Anaesthetic management of a parturient with Turner syndrome and preeclampsia for cesarean section: A Case Report and Literature Review.

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Turner syndrome is a genetic disorder characterized by short stature, gonadal dysgenesis, and facial malformations. Due to the high prevalence of primary amenorrhea, the use of hormonal

supplementation and assisted reproduction is common. We present a case of a 47-year-old Turner parturient, with preeclampsia who underwent caesarean section under Combined Spinal Epidural Anaesthesia (CSEA) and developed antepartum haemorrhage, which was attributed to uterine atony. The features that make this case interesting are the predicted difficult airway and cardiovascular morbidity, related to Turner syndrome, which are aggravated with pre-eclampsia. Uterine atony further complicated this case. Anaesthetic management and literature review are discussed.

Keywords: Turner syndrome, pre-eclampsia, premature, cesarean section, uterine atony

INTRODUCTION

Turner syndrome is a genetic disorder that was first described by Ullrich in 1930¹, followed by a report of a 7-women series with the phenotype

of turner syndrome, “short-stature and gonadal dysgenesis”, by the American physician Henry Turner in 1938².

The main phenotypical characteristics of Turner syndrome are the short stature which is prevalent in approximately 9 out of 10 cases, the zygomandibular abnormalities, cardiovascular abnormalities, endocrine, and reproductive dysfunctions³.

The most common Turner karyotypes are 45, X. Additionally, there are other karyotypes, such as 47, XXX, 46, XX, 46 XY etc. Apart from the 45, X all the others karyotypes, are termed mosaic⁴. Some mosaicisms ameliorate the phenotype of the patients, while others do not⁴.

Regarding Turner syndrome and pregnancy, there are several parameters that need to be considered. Due to underdeveloped secondary sexual characteristics and primary amenorrhea, hormonal replacement therapy is administered in most cases⁵. Incidence of spontaneous pregnancy is not common, due to the gonadal dysfunction as previously mentioned. There is high prevalence of spontaneous abortion, intrauterine growth restriction (IUGR) and preterm delivery⁴. In a large retrospective cohort study with 408 women, the occurrence of spontaneous pregnancies was approximately 5.6 % with a mean age of 27 years. The incidence of miscarriage was double in Turner syndrome and the rate of pregnancy-induced hypertension, and other cardiovascular adverse events were high, compared to general population⁶. Due to the increased morbidity of the mothers, preterm delivery and caesarean section is not uncommon⁷.

Concerning the anaesthetic management of those cases, there are several issues that must be taken into consideration. Those patients are often characterized by facial malformations and deformities, such as short neck, short trachea⁸, microretrognathia³ and temporo-mandibular joint calcification⁵ resulting in difficult airway management. This could be challenging for the anaesthesiologist. Turner's syndrome airway anatomy in combination with increased difficulty of airway management related to pregnancy, could lead to major complications. Regional anaesthesia is generally preferred in those patients; however, their short stature should be considered for the estimation of the optimal aesthetic dose. Moreover, chronic use of hormone supplements may be related to some degree of hepatic dysfunction, and coagulation disorders. On that note, complete blood coagulability testing is necessary. Furthermore, cardiovascular disorders are the main factors of morbidity and mortality for those parturients. Aortic stenosis and coarctation of aorta are not uncommon reaching a rate of 45%⁵, therefore medical history, physical status performance and cardiac evaluation with echocardiography study should always be performed before the appropriate aesthetic method is applied.

CASE REPORT

We present the case of a 47-year-old woman with Turner syndrome, unspecified karyotype, who became pregnant after several cycles of

assisted reproduction. Height was 150 cm and her weight 55 kg. She had a history of a car accident, after which she underwent multiple surgeries for femoral fractures. During pregnancy, she developed Pregnancy-Induced Hypertension (PIH), which was later characterized pre-eclampsia, as proteinuria was also noted. She was treated with methyldopa 250mg twice daily. Additionally, she received acetylsalicylic acid (100 mg) once daily until the day before the caesarean section, as well as progesterone twice a day.

On the 32 weeks of pregnancy, it was decided that the parturient would be admitted to the hospital for daily evaluation, due to pre-eclampsia and the possibility of IUGR (by ultrasound and Non-Stress Test). Renal and cardiac evaluations were performed. Echocardiography was conducted, which demonstrated normal systolic and diastolic cardiac function with an estimated Ejection Fraction of 55%. The valves were characterized as normal, except for a mild degree of aortic regurgitation. Daily arterial pressure measurements indicated an average Systolic Arterial Pressure (SAP) of 150 mmHg and Diastolic Arterial Pressure (DAP) of 90 mmHg.

Obstetricians decided to perform a preterm delivery 9 days after admission due to IUGR. Pre-operative blood count was, Haematocrit of 38%, Haemoglobin of 12.9 g/dl, platelet count of 220×10^9 , White Blood cell count of 10.700. As for the blood coagulation, International

Normalized Ratio (INR) was 0.85 and Partial Thromboplastin Time (APTT) of 27.8 s.

In preanaesthetic visit parturient signed the informed consent. We assessed the patient's airway, and the Mallampati score was 3, Thyromental distance (TMD) was 3,5 cm, while the Upper Lip Bite Test score was 3, indicating a predicted difficult airway.

Because of this prediction and the preserved cardiac function, we decided to perform Combined Spinal Epidural Anaesthesia (CSE).

On arrival in the operating room intravenous access was established with two peripheral intravenous lines 18G and basic monitoring was connected. Pulse Oxygen Saturation (SpO₂) was 99% at a FiO₂ 0.21, SAP was 190 mmHg, DAP was 110 mmHg and Heart Rate was 100 beats/min.

On the left lateral position, a sterile procedure was followed, and a CSEA was performed at the spinal level of L3-L4. The epidural space was detected with the Loss of Resistance with Air technique (RapID™ Spinal/Epidural Minipack, Pencil Point Needle 27G/18G Smiths medical portex). Spinal anaesthesia was performed with 1.6 mL of ropivacaine 0.75% and 15 µg of fentanyl. After 10 minutes the level of sympathetic block had reached the fourth thoracic dermatome with a Bromage score of 3 (complete motor block of the legs). The SAP/DAP was 160/110 mmHg and 140/90 mmHg 5 and 10 minutes respectively after the

spinal, without the use of vasoconstrictors. A urinary catheter was inserted.

A male neonate was delivered (1360gr), with Apgar scores of 7 and 8 at the first and fifth minute, respectively. After birth, an Oxytocin infusion (20 IU/1000ml Lactated Ringer's) was started as an uterotonic in order to minimize blood loss. Towards the end of the operation, and while the obstetricians were sewing the last skin layer, the SAP/DAP of the woman dropped in a declining fashion, up to 65/25 mmHg. Lactated Ringer's 1000 ml and vasoconstrictors were administered, (ephedrine 50 mg infusion and phenylephrine of 50 µg bolus doses), while the heart rate had reached 120 bpm. An ABG was obtained, which showed a pH of 7.41, CO₂ of 28 mmHg, pO₂ of 85, HCO₃ of 17.7 mmol/L, Lac of 3 mmol/L and Hb of 7 g/dL. The obstetricians were called to examine the uterus, and after clinical examination it was found that it was inadequately contracting.

Tranexamic acid (1g) and 10 ml of CaCl 10% was administered, and new blood tests were sent to the laboratory. Oxytocin infusion was interrupted and Carbetocin 100 mcg was administered. Two units of Red Blood Cells and one unit of Fresh Frozen Plasma were transfused. Blood Pressure was stabilized to 110/70 mmHg, HR 76 b/min and the obstetricians examined the uterus and found that it was adequately contracting. Blood count at the end of surgery showed a Hct of 25.7 %, Hb of 8.8 g/dL, INR of 1.05, APTT of 35 s, and PLT of

155 x 10⁹. The patient was then transferred to the PACU and was monitored for 24 hours. Her BP was stable, and 12 hours later received two more FFP's by the obstetricians. In the second postoperative day, Hb level was 9.5 g/dL, Hct of 29 % and INR 1,10. Further nephrology and cardiologic evaluations were performed with no remarkable results. The woman was discharged from the clinic after 6 days.

DISCUSSION

There are several issues one must consider for this relatively complex case.

Turner syndrome is characterized by specific phenotypical features as previously mentioned. First the short stature is prominent in the majority of cases³ with a mean deviation of 20-22 cm from the average population height⁹. The specific parturient height was 150 cm which falls under this range. Secondly, the facial characteristics are quite typical as well, but they are greatly dependent on the karyotype of the individual. In general, they are characterized by limited neck motility, high-vaulted palate, underdeveloped maxilla and mandibular bone, as well as occasional non-motile joints, which could cause immobile zygomatic-mandibular joint and limitation in mouth opening⁵. In the case of this parturient, there were some features that indicated the possibility of difficult airway¹⁰. The Mallampati score was graded as 3. Mouth opening was 3 cm with high-arch palate. Moreover, the TMD was 3,5 cm which is also a

negative prognostic marker for difficult airway¹⁰. Finally, ULBT which was found to have a sensitivity of more than 70% to predict difficult airway¹¹ was graded as 3. However, the fact that the woman had received general anaesthesia multiple times in the past could function as a positive predictive factor concerning the airway. In this case the woman was pregnant, pre-eclamptic, and airway oedema is often evident in such cases. Additionally, short trachea and high bifurcation point in the trachea have been noted in the past¹². In fact, this could lead to inability to ventilate both lungs and result in left lung atelectasis.

Cardiovascular complications are a common cause of morbidity and mortality in this population. The most typical traits are bicuspid aortic valve and aortic stenosis, as well as coarctation of aorta⁵, with the most dramatic cardiovascular event being aortic dissection⁴. Several points need to be anticipated for the specific parturient. First, she had undergone echocardiography, which was non-pathologic, since the aortic diameter was within normal range. However, according to the American Society of Reproductive Medicine, a single echocardiographic measurement of the aortic diameter may not be adequate for exclusion of pathologic dilation of aorta, since this population is characterized by short stature, and a cardiac MRI should be obtained, with specific adjustment of the Body Surface Area (BSA), and an estimation of the Aortic Size Index (ASI) should be made, so that

does not exceed 2.0 cm/m²¹³. Moreover, the parturient suffered from pre-eclampsia, for which she received medication. Hypertensive disorders of pregnancy (HDP) are very common in Turner syndrome, especially in women who undergo artificial fertilization compared to women who do not⁴. Possible explanations for that are the younger age of women who become pregnant spontaneously, as well as mosaic karyotypes that favors fertility more⁴. In this regard, the prevalence of HDP has been found to be as high as 30-50 % in Turner syndrome pregnancies, and subsequently this could lead to aortic dissection or rupture¹⁴.

Pre-eclampsia is a state of endothelial dysfunction which is mediated by several factors that are excreted by the placenta and favors synthesis and generation of vasoconstrictive substances compared to vasodilators¹⁵. This leads to a generalized vasoconstriction. There is deterioration of utero-placental blood flow, leading to ineffective nutrient delivery to the foetus and possible IUGR¹⁵. Moreover, pre-eclampsia is associated with airway venous congestion and oedema¹⁶. According to a large systematic Cochrane review gathering data from 36,716 women, without hypertension, with chronic hypertension and with PIH, there is an 18% risk reduction in parturient who receive anti-platelet medication to develop pre-eclampsia¹⁷. Thus, women with hypertension in our hospital receive low dose acetylsalicylic acid. In the specific one, there was interruption of acetylsali-

cylic acid administration 24 hours before the operation. According to the American Society of Regional Anaesthesia, low dose acetylsalicylic acid (under 200 mg/day) should not be stopped for regional anaesthesia to be performed¹⁸.

Anticipating the specific parturient health state, the decision was made that regional anaesthesia is optimal. The goal was to avoid the sympathostimulating effect of laryngoscopy and the possibility of difficult airway resulting from Turner's, pregnancy and pre-eclampsia. Moreover, spinal anaesthesia has been found to be a safe option for pre-eclampsia since the catecholamine effects are reduced. Additionally, increased risk of sudden hypotension has not been proven in those patients¹⁹. Furthermore, the epidural analgesia has been found to be superior to women suffering from pre-eclampsia in the first days after caesarean section, compared to general anaesthesia, and spinal anaesthesia. For that reason, we left in situ the epidural catheter for optimal postoperative analgesia¹⁵.

According to our knowledge, there have not been many reports about the aesthetic management of obstetric Turner parturient. Low-dose CSE was performed in a case reported by Kalopita et.al, instead of a normal dose that we performed. An important difference between those cases is that in our case the pregnancy was 33rd week and not 37th as in the aforementioned case²⁰.

Other examples of aesthetic management of Turner patients have been described^{8,21} and they vary. Mashour et al described a case of a patient that underwent Tibial Open- Reduction Internal Fixation (ORIF) and used awake fibreoptic intubation after prediction of difficult airway⁸. Gupta et al described a case of a polymeric Turner patient that underwent intertrochanteric femoral repair, and they used low-dose spinal anaesthesia in order to avoid cardiovascular compromise²¹.

Concerning the sudden decrease of Arterial Pressure that occurred towards the end of the surgery and was attributed to uterine atony, there are several things to consider. To begin with, uterine atony is a state of insufficient myometrial cell contraction which results in excessive uterine bleeding, since spiral arteries are unable to vasoconstrict²². According to literature, there seems to be no connection between Turner syndrome and uterine atony alone, however, both chronic hypertension and pre-eclampsia seem to be risk factors for uterine atony²³, and the high prevalence of both the conditions in Turner syndrome could render it as an indirect risk factor. According to a large systematic review, pre-term delivery was not associated with uterine atony, while increased maternal age and general anaesthesia seem to have a positive correlation with it²³.

Furthermore, one must anticipate the high incidence of aortic dissection in Turner syndrome parturient and post-parturient as previously

mentioned. It is partly attributed to the increase in cardiac output and the vascular wall thickening exacerbated by this condition⁷. Post-operative echocardiography was ordered to detect any changes.

In conclusion, parturient with Turner syndrome are often in a polymorbid state due to multiple factors, such as assisted reproduction and older age, chronic hormonal supplement administration and hepatic dysfunction, congenital cardiac abnormalities, and others. On that note, many specialties must be involved in their management. It is essential to assure a preserved cardiac function even before initiating the efforts of assisted reproduction. As for the aesthetic management, one must weigh the risk benefit situation and decide based on the guidelines, the patient's clinical status and clinical judgement.

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PD 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.

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