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CASE REVIEW

Ovarian Hyperstimulation Syndrome Following IVF in a Patient with PCOS: A Case Review

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Abstract

Ovarian Hyperstimulation Syndrome (OHSS) is a serious iatrogenic complication of assisted re-productive technologies, particularly in patients with polycystic ovary syndrome (PCOS). This case report presents the clinical course of a 28-year-old woman who developed moderate OHSS following ovarian stimulation and oocyte retrieval during in vitro fertilisation (IVF). Her risk factors included PCOS, insulin resistance, and a high ovarian response, with 26 oocytes re-trieved. She presented to the Emergency Department with abdominal pain, distension, nausea, and biochemical findings indicative of third-space fluid shifts and early renal and hepatic in-volvement. Management involved fluid resuscitation, thromboprophylaxis, analgesia, antie-metics, and continuation of cabergoline to suppress vascular endothelial growth factor (VEGF)-mediated permeability. Following clinical and biochemical stabilisation, she was dis-charged with outpatient follow-up and a plan to revise future IVF protocols. This case highlights the need for pre-emptive risk stratification and individualised stimulation protocols, particularly in high-risk patients, to prevent OHSS while maintaining fertility outcomes.

Keywords

Ovarian hyperstimulation syndrome, *In vitro* fertilisation, PCOS, Gonadotropin dosing, VEGF, Cabergoline

Introduction

OHSS is a recognised complication of assisted reproductive techniques, characterised by increased vascular permeability, third-space fluid accumulation, and systemic complications [1]. VEGF activation by human chorionic gonadotrophin (hCG) plays a central role in pathogenesis [2]. OHSS is graded by severity; mild cases occur in up to one-third of ovarian stimulation cycles, moderate to severe cases in 3-6%, and hospitalisation is re-quired in fewer than 2% [3]. Risk factors include PCOS, age under 35, low BMI, high antral follicle count, elevated anti-Müllerian hormone, and high oestradiol levels [4]. Early recognition and prevention are essential to avoid thromboembolism, renal dysfunction, and respiratory complications [5].

Case Presentation

Jemma, a 26-year-old nulliparous woman, presented to a rural emergency department 24 hours following egg retrieval with abdominal bloating, shortness of breath, and pelvic discomfort. Her symptoms began several hours post-procedure and progressively wors-ened. She denied nausea, vomiting, or fever.

Her medical history included PCOS, insulin resistance managed with metformin, and a five-year history of primary infertility. She had no significant past medical or surgical history and no family history of thrombosis or ovarian malignancy. She was otherwise fit and well.

IVF had been initiated at a private fertility clinic, involving ovarian stimulation with gon-adotropins. Although the exact medication and dose were unavailable, Jemma reported developing significant bloating during stimulation, culminating in the retrieval of 34 oo-cytes. No ovulation trigger details were documented in the referral.

On examination, Jemma was afebrile, normotensive (BP 118/75 mmHg), with a heart rate of 100 bpm and oxygen saturation of 98% on room air. Her abdomen was distended with shifting dullness, and pelvic examination

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revealed bilateral adnexal tenderness without signs of peritonism. Cardiopulmonary examination was unremarkable.

Investigations

Laboratory studies revealed chloride 112 mmol/L (high), bicarbonate 21 mmol/L (low), urea 1.7 mmol/L (low), ALP 132 U/L (high), GGT 51 U/L (high), ALT 84 U/L (high), calci-um 1.92 mmol/L (low), PCV 0.34 L/L (low), and CRP 17.4 mg/L (high). These suggest res-piratory alkalosis (chloride/bicarbonate), early renal impairment (low urea), hepatic con-gestion (elevated liver enzymes), and inflammation (CRP), consistent with OHSS fluid shifts and third spacing [6-8]. A transvaginal ultrasound revealed bilaterally enlarged ovaries (>12 cm) with multiple theca-lutein cysts and moderate free fluid in the pelvis. Chest X-ray excluded pleural effusion.

Diagnosis and management

A clinical diagnosis of moderate OHSS was made based on the patient's symptoms, ul-trasound findings, and haemoconcentration. She was admitted for supportive care in-cluding intravenous hydration, prophylactic enoxaparin, ondansetron for nausea, and monitoring of input/output and daily weights. The fertility clinic was contacted to obtain stimulation protocol details, and follow-up plans were established. Her symptoms im-proved gradually, and paracentesis was not required. She was discharged after three days with outpatient follow-up and advice to seek early care if symptoms recurred.

Discussion

OHSS is an iatrogenic condition triggered by excessive ovarian response to controlled ovarian hyperstimulation. It is mediated by increased vascular endothelial growth factor (VEGF), leading to capillary leakage, third spacing, and systemic complications [9,10]. Women with PCOS are particularly vulnerable due to their heightened ovarian sensitivity and increased follicular recruitment [11].

This case highlights several risk factors for OHSS, including PCOS, insulin resistance, and a high number of oocytes retrieved. The development of 26 follicles and the retrieval of 26 oocytes suggest an excessive ovarian response, possibly exacerbated by the use of a full-dose hCG trigger or high gonadotropin dose. Lack of preventive measures such as cy-cle segmentation (e.g., freeze-all) or use of a GnRH agonist trigger raises concern for pro-tocol individualisation in high-risk patients.

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) recommends identifying patients at risk of OHSS and implementing preven-tive strategies, including the use of lower gonadotropin doses, GnRH antagonist protocols, and consideration of cabergoline, metformin, or letrozole [12]. The American Society for Reproductive Medicine (ASRM) similarly advocates for cycle segmentation and the use of GnRH agonist triggers in antagonist cycles to prevent OHSS in high responders [13].

Challenges and risks

IVF aims to retrieve the maximum number of oocytes for a successful pregnancy. There-fore, needs to be tailored to an individual's risk factors particularly in high responders with PCOS such as Jemma. One of the key challenges in Jemma's case is the aggressive stimulation approach used during her IVF treatment. The retrieval of 26 oocytes exceeded the recommended threshold of and triggered OHSS without proportional pregnancy suc-cess, a pattern supported by evidence showing diminished returns beyond 15 oocytes [11]. Additionally, there was an absence of pre-emptive adjustment to her gonadotropin dos-ing. Her risk of OHSS was further exacerbated by using hCG, which is known to prolong VEGF activity, worsening OHSS [14].

Alternative interventions

Alternative options for her IVF treatment plan can result in improved health outcomes. The primary cause of OHSS is the excessive follicular development. Reducing gonadotro-pin doses can minimise excessive follicular development and lower OHSS risk [14]. An-other strategy includes the use of GnRH antagonist protocols that prevent premature LH surge and allow flexibility in triggering ovulation [14]. Elective freeze-all cycles allow ovarian recovery and reduce OHSS risk [15]. Additionally, GnRH agonist triggers reduce OHSS risk by inducing a shorter LH surge, unlike hCG, which has a longer half-life and increases risk [15].

CRP may indicate OHSS severity, though it is not standardized [7]. Anticoagulation miti-gates thromboembolic risk, but data on long-term outcomes in moderate OHSS are limited [5]. Future management should include these alternatives and improve patient monitor-ing to promote greater efficacy and safety so that there is a minimised risk of OHSS recur-rence in Jemma's next IVF attempt.

Critical evaluation of evidence

The association of more than 15 oocytes has been linked with an increased risk of OHSS, as stated in the literature, particularly in patients with PCOS, such as Jemma. The lack of dosage recommendations for PCOS is a concern, given that the protocols' impact on ovar-ian response varies among individuals [11]. GnRH agonist triggers are safer than hCG, but PCOS patients remain underrepresented in trials despite their higher risk [14,15]. The OHSS rate is about 1% in PCOS and is consistent with clinical experience, with limited RCT evidence regarding the thresholds (15). RCTs for OHSS prevention are limited due to ethical concerns, for

example, randomising high-risk patients to potentially harmful pro-tocols [15].

Tailored protocols for OHSS prevention, such as adjusting gonadotropin doses, are often recommended but are not always supported by RCTs due to ethical and logistical chal-lenges in studying high-risk patients. CRP is one of the parameters that can serve as an indicator of the severity of OHSS (Jemma's 174 mg/L), since inflammation is one of the mechanisms of disease development. Nevertheless, its predictive value has not been es-tablished, and the biomarkers for OHSS are still being refined [7]. Thromboembolism pre-vention is essential in OHSS because of the hypercoagulability; however, the long-term outcomes of mild OHSS (if Jemma's case is considered mild) have not been well described because most studies focus on severe OHSS [5]. Reactive rather than preventive care re-flects broader challenges: limited PCOS-specific trials, absent dose guidelines, and insuffi-cient evidence to guide stimulation and monitoring protocols.

Conclusion

Ovarian Hyperstimulation Syndrome (OHSS) can be a complication of Assisted Repro-ductive Technology (ART), such as in vitro fertilisation (IVF). Jemma's management was appropriate as per her presentation. Her OHSS was effectively managed at the hospital. GP will liaise with the IVF clinic so that they can modify Jemma's future fertility plans as per her personal medical history to prevent any future complications. Further education can be provided to Jemma about individualised stimulation strategies, including lower doses and agonist triggers to prevent recurrence for future IVF attempts and promote a safe and successful pregnancy.

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