CASE REPORT

A novel approach to the treatment of ascites associated with ovarian hyperstimulation syndrome

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Ascites is a clinical manifestation of severe ovarian hyperstimulation syndrome (OHSS) which may complicate the induction of ovulation using exogenous gonadotrophins. In severe OHSS severe ascites may occur and can lead to dyspnoea, abdominal discomfort and oliguria. To relieve ascites paracentesis is performed two to three times weekly as needed. We report three cases where an indwelling peritoneal catheter was used to decrease the need for repeated paracentesis. Under ultrasound guidance a closed system Dawson–Mueller catheter was used to allow continuous drainage of the ascitic fluid. A total of 23 l of the ascitic fluid were drained from the first, 20 l from the second and 28 l from the third patient with significant decrease in abdominal discomfort and improvement in the urine output. No complications or adverse reactions were noted. Continuous drainage of the ascitic fluid is efficient. It quickly decreases the abdominal discomfort, improves the urine output and prevents the need for multiple abdominal paracenteses which some patients may require.

Key words: ascites/ovarian hyperstimulation syndrome/paracentesis

Introduction

Ovarian hyperstimulation syndrome (OHSS) is the most serious complication of ovulation induction. After in-vitro fertilization (IVF)–embryo transfer, the total incidence is reported to range from 0.6 – 14% (Rizk, 1992); however, the incidence of severe OHSS is ~1–2% (Smitz et al., 1990). Mild cases are characterized by formation of multiple ovarian cysts associated with excess steroid production and ovarian enlargement; moderate OHSS is associated with abdominal distention, nausea, diarrhoea or vomiting. In severe OHSS, ascites, hydrothorax, electrolyte imbalance, haemoconcentration, hypovolaemia, oliguria or thromboemboli have been reported. Management of severe OHSS includes hospitalization for fluid and electrolyte management, paracentesis as needed and mini-dose heparin prophylaxis to prevent thromboembolic complications (Hignett et al., 1995). Large amounts of ascites can accumulate and lead to severe abdominal discomfort, dyspnoea and decreased urine output. Abdominal paracentesis has been used to improve the patient’s general condition by reducing dyspnoea and improving urine output. However, with standard paracentesis, repeated procedures may be necessary which are inconvenient, uncomfortable and potentially dangerous. We report three cases of severe OHSS following IVF–embryo transfer with massive ascites in which we performed continuous drainage of the ascitic fluid using a closed system catheter.

Case 1

A 35 year old nulligravid patient with 6 years of primary unexplained infertility was treated with IVF–embryo transfer. After down-regulation and suppression had been achieved using a gonadotrophin-releasing hormone analogue (GnRHa), human menopausal gonadotrophin (HMG, Humegon; Organon, Scarborough, Canada) 225 IU/day i.m. was administered. A total of 23.5 ampoules of HMG was given and human chorionic gonadotrophin (HCG, Profasi; Serono, Mississauga, Canada) 10 000 IU s.c. was administered on day 11 of HMG. At the time of HCG the oestradiol concentration was 15 659 pmol/l and a transvaginal ultrasound showed six follicles ≥17 mm, 10 follicles ≥15 mm and 14 follicles <15 mm mean follicular diameter. A transvaginal ultrasound-guided oocyte retrieval was performed 36 h after HCG administration. Fifteen oocytes were obtained and total of six oocytes fertilized. Two 2-cell embryos and two 3-cell embryos were transferred 48 h later.

Three days after embryo transfer, the patient presented complaining of abdominal bloating, nausea, vomiting, shortness of breath and a history of a 2 kg weight gain over 2 days. On examination her pulse was 88/min and her blood pressure was 110/78 mmHg. The chest was clear, the abdomen was distended, the ovaries were enlarged and ascites was present. Laboratory tests included haemoglobin 180 g/l, haematocrit 0.55, white blood cell concentration of 19.1×10⁹/l and platelet concentration of 308×10⁹/l. The electrolyte concentrations were: sodium 132 mmol/l, potassium 5.4 mmol/l, creatinine 69 µmol/l and albumin 39 g/l. She was admitted and rehydrated with normal saline 125 ml/h i.v. and a 25% albumin solution at 10–30 ml/h. Bolus doses of 500 ml normal saline were used as needed with evidence of increased dehydration (i.e. decreased urine output, haemoconcentration, increased urine specific gravity). She was started on heparin 5000 IU s.c. every 12 h. A positive β-HCG of 25 IU/l was documented 11 days after embryo transfer. After a few days the patient

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developed shortness of breath, weight gain with increasing abdominal girth and with massive ascites for which she had five paracenteses over the following 2 weeks. About 8.5 l of ascitic fluid were drained in total. On the 17th day of hospitalization, a closed system Dawson–Mueller catheter with ‘simp-loc’ locking design (Cook, Bloomington, IN, USA) was inserted into the abdominal cavity under ultrasound guidance for continuous drainage of the ascitic fluid. A total of 15 l of ascitic fluid was drained over the next 7 days. There was a noticeable decrease in abdominal discomfort, abdominal girth, weight and an improvement in the urine output. No complications or adverse reactions were noted. The catheter was removed and the patient was discharged after 24 days of hospitalization. Heparin 5000 IU s.c. every 12 h was continued for 1 week after hospital discharge.

Case 2
A 35 year old nulligravid patient with a 4.5 year history of primary infertility and bilateral tubal obstruction was treated with IVF–embryo transfer. Her first IVF cycle using GnRHa for down-regulation and HMG 150 IU/day i.m. for the induction of ovulation was uncomplicated, with an oestradiol concentration of 7933 pmol/l at HCG trigger. Embryo transfer did not occur due to failed fertilization. A second IVF–embryo transfer was performed 4 months later using GnRHa for down-regulation and HMG 150 IU/day i.m. for the induction of ovulation. A total of 30 ampoules of HMG was given and HCG 10 000 IU s.c. was given on day 11 of HMG at an oestradiol concentration of 13880 pmol/l. At the time of HCG, transvaginal ultrasound showed three follicles ≥17 mm, two follicles ≥15 mm and <15 mm diameter. A transvaginal oocyte retrieval was performed and 16 oocytes were obtained. A total of three oocytes fertilized using intracytoplasmic sperm injection (ICSI). All were 4-cell embryos when they were transferred 48 h later.

Seven days after embryo transfer, the patient presented complaining of abdominal discomfort and shortness of breath. On examination her pulse was 88/min and her blood pressure was 132/70 mmHg. The chest was clear and the abdomen was distended. The oocytes were enlarged and clinical ascites was present. Laboratory tests included haemoglobin 139 g/l, haematocrit 0.45, white blood cell count 15.6×10^9/l, platelets 340×10^9/l, sodium 134 mmol/l, potassium 4.9 mmol/l, urea 4.2 mmol/l, creatinine 50 μmol/l, albumin 32 g/l. She was admitted and rehydrated as outlined in case 1. She was given heparin 5000 IU s.c. every 12 h. Three days later, the patient started to complain of more severe abdominal discomfort, shortness of breath, weight gain, increase in abdominal girth. Under ultrasound guidance, a closed system Dawson–Mueller catheter with ‘simp-loc’ locking design was inserted to allow continuous drainage of the ascitic fluid. A total of 28 l of ascitic fluid was drained over the next 10 days. A daily ascitic fluid sample was taken for culture to rule out any intraperitoneal infection. A positive β-HCG of 38 IU/l was documented 11 days after embryo transfer. There was a noticeable decrease in abdominal discomfort, weight, abdominal girth and an improvement in the urine output. No complications or adverse reactions were noted. The severe OHSS was resolved after 13 days of admission. The patient was discharged 2 days later in good general condition.

Discussion
The frequency of OHSS has increased with the increased use of ovulation induction agents needed for ovarian stimulation for assisted reproductive technology therapy such as IVF–embryo transfer. The pathogenesis of OHSS is still unclear. It is believed that overstimulation of the ovarian renin–angiotensin system (OVRAS) may play a part (Ong et al., 1991). It has been suggested that in the presence of high concentrations of oestrogen the ovary secretes an angiotensin II-like substance which leads to vasodilatation and increased capillary permeability (Asch et al., 1993). The increase in capillary permeability leads to a shift of fluid to the third space compartments, mainly the peritoneal cavity with the formation of ascites. Massive
ascites can lead to severe abdominal distention and dyspnoea. When patients present with dyspnoea, abdominal distention and oliguria, paracentesis relieves the symptoms, changes the course of illness and shortens the hospital stay (Aboughar et al., 1993; Leader, 1994). Furthermore the removal of a large amount of angiotensin II by paracentesis may explain the dramatic improvement in the patient’s general condition (Delbaere et al., 1994).

In the cases reported above, the first patient had paracentesis undertaken five times over 2 weeks with the removal of a total of 8.5 l of ascitic fluid. After insertion of a closed system catheter a further 15 l of ascitic fluid were drained over 7 days. There was a marked improvement in her general condition, a dramatic decrease in abdominal distention, abdominal girth and weight with an improvement in urine output. The second patient also had an improvement in her general condition after draining of ~20 l over 9 days. The third patient had a significant improvement in her general condition and improved urine output after draining of 28 l over 10 days. All patients had intravenous fluid management including albumin, strict observation of fluid intake and output and heparin 5000 IU s.c. every 12 h for the prevention of venous thrombosis. No complications or adverse reactions to the catheter system were reported and patients were discharged home in good general condition. The first two pregnancies proceeded to viability while the third was a blighted ovum. Every attempt should be made to prevent severe OHSS. It has been suggested that OHSS may be prevented by: avoiding the administration of HCG, thereby cancelling the cycle; cryopreserving all embryos and later transferring in another cycle (Tiitinen et al., 1995); using progesterone for luteal phase support rather than HCG (Araujo et al., 1994) and discontinuing gonadotrophins (coasting) and withholding HCG administration until the serum oestradiol concentration returns to reasonable levels (Urman et al., 1992). While all of these patients were at risk for severe OHSS, they opted for HCG injection, oocyte retrieval and transfer of embryos without cryopreservation. We have used intravenous albumin in the past but were not satisfied that it prevented severe OHSS (Ng et al., 1995). When OHSS does occur, paracentesis is a reasonable intervention. The placement of an indwelling catheter has been used in both dialysis and cancer patients to achieve metabolic equilibrium or relieve the pressure of ascitic fluid. When paracentesis is contemplated and repeated attempts seem likely, we have shown that continuous drainage of the ascitic fluid is a better alternative to multiple abdominal paracentesis in the management of severe OHSS.

References

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