was followed by 0.2 ml lupride from day 2 of menstrual cycle stimulation cycle after confirming down regulation. Stimulation with recombinant FSH (recacon – Organon) was started on day 2 of menstrual cycle, starting recacon dose was 175 IU s/c for duration of 10 days. Coasting was done for next 2 days by avoiding recacon with continuation of lupride. Peak estrogen level on day of HCG was – 4995 pg/ml and progesterone – 2.7 nmol/l. HCG 5000 IU intramuscularly was given for oocyte maturation. Oocyte retrieval was done on day 14 of cycle. Total of 30 oocytes were retrieved. Right ovary was 7×7 cm and left ovary was 6×7 cm. She had moderate OHSS managed conservatively with i/v albumin, fluids and high-protein diet. In view of OHSS extended culture of embryos done and three blastocysts were cryopreserved. Five days after oocyte retrieval, she came with sudden onset of severe right-sided abdominal pain with increasing severity in next 2 hours. On examination, she had tachycardia+ 108/min, blood pressure – 100/70, respiratory rate – 20/mnt. She had moderate abdominal distension, severe right-sided guarding and tenderness and abdominal girth 102 cm. Abdominal ultrasound done suggested enlarged bilateral ovarian right 14×10 cm and left 8×9 cm with multiple cysts, fluid in paracolic gutter and Morrison’s pouch. She was diagnosed with severe OHSS. Doppler study was not conclusive about torsion. Pain decreased with injection Tramadol. With further episode of severe abdominal pain after 2 hours of admission, decision was made for emergency laparoscopy.

INTRODUCTION

Torsion of a stimulated ovary occurring after *in vitro* fertilization (IVF)/intrauterine insemination (IUI) is a rare event.[1] Ovarian torsion should be suspected and ruled out in any female undergoing ovulation induction for IUI or IVF, presenting with severe abdominal pain. Delay in diagnosis and management could lead to ischemic necrosis of ovary. Here we present two case reports of ovarian torsion.

CASE REPORTS

Case 1

A 33-year-old lady with secondary infertility of 7-year duration, with bilateral polycystic ovaries and history of complete septal resection came for further treatment to our clinic. She had conceived with first cycle of IUI but aborted at 8 weeks. She further took four cycle of IUI but failed to conceive. In the third cycle of IUI she had mild ovarian hyperstimulation syndrome (OHSS) but managed conservatively. She was on eltroxin 50 mcg daily since 5 years for hypothyroidism and her body mass index was 35. She was planned for controlled ovarian stimulation for IVF and was given long protocol. Combined estrogen, progesterone pill was given from day 2 to day 22 of previous cycle and inj. Leuprolide acetate (Lupride®, Sun Pharmaceutical, Halol, Gujarat, India) 0.5 ml subcutaneously was started on day 21 of her previous menstrual cycle. This

ABSTRACT

Ovarian torsion is a rare entity and the diagnosis is commonly missed. Here we present a series of two cases of ovarian torsion. First case followed the *in vitro* fertilization treatment, along with ovarian hyperstimulation syndrome, where even with timely intervention and laparoscopy, we had to compromise one ovary. Second case followed the ovulation induction and intrauterine insemination – where timely intervention helped us to save the ovary.

KEY WORDS: Color Doppler sonography, ovarian hyperstimulation, ovarian torsion
The findings were - uterus normal in size, left ovary 9×8 cm, right ovary was enlarged and gangrenous and twisted twice over the pedicle 15×15 cm, with 500 ml of hemoperitoneum. Detorsion was not possible due to large size and friability of right ovary. Right salpingo-oophorectomy was done. Specimen was retrieved through endobag. Thorough peritoneal lavage was given and Port closure done [Figure 1]. Postoperative period was uneventful. Histopathology report was - ovarian tissue with hemorrhage and necrosis (hemorrhagic infarct).

Blastocyst transfer was done 3 months later, but she failed to conceive.

**Case 2**
A 31-year-old female, with primary infertility since 3 years, bilateral polycystic ovary, previous 4 failed cycles of ovulation induction and timed intercourse came to our clinic for further treatment. Hysterosalpingogram was normal with bilateral tubal spill. Semen analysis of husband was normal. Antral follicle count was 20. Ovulation induction with clomiphene-100 mg×5 days and human menopausal gonadotrophin (total dose 300 IU i/m) was given. On day 13 there were two dominant follicles in left ovary. Injection human chorionic gonadotrophin (HCG) 5000 IU was given i/m and IUI was done twice at 24 and 48 hrs of injection. Ovulation confirmed on 2nd day IUI. Luteal phase support was given with vaginal progesterone for 14 days. Twelve days after IUI she came with severe left-sided abdominal pain with outside scan suggesting hemorrhagic cyst in left ovary. Pain was severe and not relieved with analgesic tramadol. On doing Doppler ultrasound enlarged left ovary compared with right was seen. Right ovary was 4.17×2.78cms and. Left ovary was 11.39×7 cm with two corpus luteal cyst. Color Doppler suggested enlarged cystic left ovary with heterogeneous reduced echo texture and scanty blood flow suggestive of torsion (partial torsion) and minimal ascitis [Figures 2 and 3].

Emergency laparoscopy was done [Figure 4]. Left ovary...
and tube was twisted thrice over the pedicle, enlarged and ischemic. Detorsion was done and the change of color of ischemic bluish tube and ovary was remarkable. Peritoneal lavage was given and port closure done. Owing to enlarged and friable ovary, fixation of pedicles of ovary could not be done. Postoperatively, 2 weeks after, repeat Doppler and USG suggested normal sized left ovary with normal blood flow and follicles. Unfortunately patient failed to conceive in this cycle. She was advised to avoid ovulation induction for next 3 months.

**DISCUSSION**

Ovarian torsion is the 5th common gynecological emergency with reported prevalence of 2.7%. Torsion of a hyperstimulated ovary is much more rarer. In 20% cases it accompanies with pregnancy, with right ovary more commonly affected. In 10% contralateral ovary is also torsed.

Ovarian torsion is defined as partial or complete rotation of ovarian vascular pedicle and causes obstruction to venous outflow and arterial inflow. Concomitant tubo-ovarian torsion is seen in 67% of adnexal torsion. Ovarian torsion can occur in females of all ages but pregnancy and infertility treatment predispose. Symptoms are nonspecific and the classical presentation is sharp localized right or left lower abdominal pain and tenderness with a palpable mass and peritoneal signs. According to Shadinger et al all patients (100%) had a chief symptom of abdominal pain, 85% reported vomiting, 56% had leukocytosis and 18% had a documented elevated temperature. The only consistent symptom is abdominal pain, usually localized to the lower quadrant.

Grey scale USG combined with Doppler is the method of choice for imaging of lower abdominal pain in female. Grey scale ultrasound features of torsion include unilateral ovarian enlargement of more than 4 cm which is the most consistent finding. Torsed ovary is usually located in midline and superior to the fundus of the uterus. Volume of the affected ovary may be 28 times more than normal. Ovarian stroma looks heterogeneous due to hemorrhage and edema. String of pearls sign may be due to follicles displaced to the periphery by marked edema and venous congestion. Localized tenderness of the affected ovary may also be elicited. Free fluid in cul de sac is a nonspecific finding. Additional findings include deviation of uterus to the twisted side and engorged blood vessels. Thus comparison with the morphological appearance and flow pattern of contralateral ovary will aid in diagnosis. A torsed ovary is almost always associated with abnormal morphological appearance.

Color Doppler imaging manifestations are highly variable. Complete absence of arterial and venous flow in a morphologically abnormal ovary is a sine qua none of ovarian torsion. Classic finding is absent arterial flow. However, the most frequent finding is decreased or absent venous flow which may reflect early collapse of compliant venous wall. However, presence of blood flow does not exclude the diagnosis.

Presence of arterial waveforms may be explained because the symptoms may result from venous thrombosis occurring before arterial obstruction and dual blood supply of the ovary. The utility of Color Doppler imaging is in determining the viability of affected ovary preoperatively. Fleischer et al said, nonviable ovary demonstrates absent central venous flow.

The promising finding incorporating both grey scale and Color Doppler sonography are twisted vascular pedicle and whirlpool sign. The twisted vascular pedicle can be visualized on grey scale ultrasound as an ellipsoid or tubular mass with internal heterogeneous echoes. Absent flow in vascular pedicle suggests necrotic ovary. Whirlpool sign is suggestive of viable ovary.

Ben-Ami and colleagues reported the positive predictive value for torsion in the absence of venous flow as 94%,
Penna and colleagues reported that color flow findings were normal in 60% and reduced or absent in 40% cases. In cases involving ovulation induction Doppler sonography were normal in 25%.

Albayram and Hamper reported duration of pain did not show any statistically significant relationship with presence or absence of ovarian arterial flow. However, the relationship between duration of pain and the absence of venous flow was significant and unexpectedly inverse.

CT and MRI may be rarely useful when findings on USG and Doppler are inconclusive. Mimics of ovarian torsion include hemorrhagic cyst, OHSS, endometriosis, PID, endometritis, adhesions, a/c appendicitis and OHSS.

In OHSS ovaries appear bilaterally enlarged due to multiple and peripherally located corpus luteal cyst–producing spoke wheel appearance. A twisted hyperstimulated ovary can be distinguished from its normal counterpart by separation of cystic elements by marked stromal swelling in torsed ovary.

In PCOS, ovary volume is commonly more than 10 cubic cm and hence prone to torsion. In both the cases presented above the patient had polycystic ovaries.
Adnexectomy was the standard treatment in the past due to fear from thromboembolism after untwisting the ovary. Studies have demonstrated that untwisting the vascular pedicle leads to recovery of ovarian function despite of necrotic appearing ovary.

CONCLUSIONS

Diagnosis of ovarian torsion needs high degree of suspicion. Acute onset abdominal pain in any female undergoing infertility treatment should be evaluated to rule out this diagnosis. Persistent or intermittent severe abdominal pain is the most consistent symptom and unilaterally enlarged ovary in ultrasound is the most consistent sign. Presence of blood flow on Doppler indicates viability of ovary and not absence of torsion. Immediate laparoscopy and detorsion is the treatment of choice. Losing the ovary due to delay in diagnosis is unacceptable especially in infertile female.

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