

Original Article

Experience with the Bonanno Catheter in the Management of OHSS from IVF-ET Cycles

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ABSTRACT

Objective: To document our experience with the use of the Bonanno catheter as a closed abdominal drain for OHSS. **Methods:** A retrospective study of all IVF embryo transfer (ET) treatment cycles carried out between May 2006 and April 2009 at a dedicated IVF centre. Case notes of patients with OHSS were retrieved and the outcome of the continuous closed abdominal drain with Bonanno catheter documented. **Result:** Within the period under review, 234 patients had controlled ovarian stimulation with ultrasound guided egg retrieval. Two hundred and twenty eight (228) got to the stage of embryo transfer with 72 clinical pregnancies. The clinical pregnancy rate was 31.58%. Fourteen (6%) of those who were stimulated developed OHSS and had a closed abdominal drain of the ascitic fluid using the Bonanno catheter. The average number of days of the abdominal drainage was 7.5days and the average volume of ascitic fluid drained from a patient per day was 2454.9 + 748mls. Eight (8) patients who had OHSS achieved clinical pregnancy (six intrauterine, one ectopic and one heterotopic pregnancies), giving a clinical pregnancy rate of 57.14% in patients with OHSS. Four patients had blocked Bonanno catheters and three of them had the catheter changed while the fourth had the catheter successfully flushed. Four patients had the insertion site dressing changed due to soaking with ascitic fluid. There was no incidence of injury to intra abdominal organs or broken catheter. **Conclusion:** Bonanno Catheter is both effective and safe in draining ascitic fluid following OHSS.

KEYWORDS: *Invitro fertilization, ovarian hyperstimulation syndrome, Bonano catheter, ascitic drainage*

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INTRODUCTION

The aim of every invitro fertilization (IVF) programme is to achieve multi follicular development, resulting in the collection of several appropriately matured eggs, without causing ovarian hyperstimulation syndrome (OHSS). This is especially true in case of women with polycystic ovarian syndrome (PCOS) as they usually exhibit greater sensitivity than women with normal ovaries to exogenous stimulation.^[1] Ovarian hyperstimulation syndrome which can be mild, moderate or severe, refers to a combination of ovarian enlargement due to multiple ovarian cysts and an acute fluid shift out of the intravascular space. In its severe form, there can be associated pleural and or pericardial effusion, electrolyte imbalance, hypovolemia and shock.^[2] The increased intra-abdominal pressure can lead to severe patient discomfort with associated hemodynamic effects on the cardiovascular circulation and diminished pulmonary

function. Suggested ways of preventing OHSS include: recognition of the risk factors; use of minimum dose and duration of gonadotropin therapy; use of gonadotropin releasing hormone antagonist protocols; coasting or cancellation of cycles; the use of GnRH agonist for final oocyte maturation and cryopreservation of embryos with later transfer.^[3-8] While abdominal paracentesis to relieve the discomfort has been recommended by some authors, others are averse to this practice because of the danger of intra-abdominal hemorrhage from inadvertent puncture of large ovarian cysts.^[9]

The Bonanno catheter is a medical device described by Dr. J.P. Bonanno in 1970 and originally designed for

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suprapubic cystostomy in cases of urethral blockage from stenotic or enlarged prostate.^[10] We have consistently used the Bonanno catheter for the drainage of ascitic fluid in patients with severe OHSS requiring paracentesis.

OBJECTIVE

To document our experience with the use of the Bonanno catheter as a closed abdominal drain for OHSS.

MATERIALS AND METHODS

This was a retrospective study of all IVF embryo transfer (ET) treatment cycles carried out between May 2006 and April 2009 at a dedicated IVF centre. Case notes of patients with OHSS were retrieved from the medical records department and the outcome of the continuous closed abdominal drain with Bonanno catheter documented. Ethical clearance for the study was obtained from the ethics committee of the institution.

TECHNIQUE

The Bonanno catheter consists of a straight metal trocar, which serves as a core and guide for a plastic tube with a curved end (Pig tail) that is kept straight while the trocar is inside [Figure 1]. At the other end of the plastic tube, a small flat plate is present that can be taped or sutured to the skin for anchorage. The drain then ends in a connector that can be connected with a drainage bag [Figure 2].

The nature of the procedure is first explained to the patient when moderate to severe OHSS requiring ascitic drainage occurs and an informed consent obtained.

The patient is placed in the supine position, occasionally in patients with severe respiratory distress, the cardiac position is used with the head at 45 degrees to the horizontal. An intravenous access line is set up and normal saline infusion commenced.

Intravenous prophylactic dose of Ampicillin and cloxacillin (Ampiclox), 1gram is administered. We usually use the left lower quadrant of the abdominal wall and occasionally the midline just inferior to the umbilicus as entry points.

The anterior superior iliac spine is located and a site 3cm, medial and 3cm superior to it is chosen.

Abdominal ultrasound scan is performed to re-confirm the presence of ascitic fluid and the absence of bowel, ovarian cyst or spleen at the chosen site. The skin around this point is sterilized and anesthetized with 5ml of 1% Lidocaine with a 25 or 27gauge needle. The

needle and attached syringe are further advanced into the abdominal wall a few millimeters at a time, gently and intermittently withdrawing the plunger to confirm the absence of blood or ascitic fluid before infiltrating with Lidocaine.

The Bonanno catheter is removed from its packet and the 18 gauge needle gently introduced into its curved sheath to straighten it out. A no.11 blade is used to make a nick on the skin at the needle entry point. The Bonanno needle with its covering sheath is held like a dart and carefully introduced through the abdominal wall layers until a 'give' is felt. Further advancement of about 5mm ensures that the abdominal wall peritoneum is traversed. The needle is gently removed while the sheath is simultaneously advanced. Ascitic fluid should freely flow through the sheath. The connector and urine bag are connected; a plaster is used to secure the flat plate of the catheter to the anterior abdominal wall. Occasionally, we sutured the connector in place. The catheter was removed when the total fluid drained was less than 1 litre in 24 hours.

RESULTS

Within the period under review, 234 patients had controlled ovarian stimulation with ultrasound guided egg retrieval. Two hundred and twenty-eight (228) got to the stage of embryo transfer with 72 clinical

Table 1: Frequency distribution of age, parity, bmi, and number of eggs retrieved

Age (Yrs)	Frequency	%
26-30	6	42.86
31-35	6	42.86
36-40	2	14.28
TOTAL	14	100
Parity	Frequency	%
0	12	85.71
1	2	14.29
Bmi	Frequency	%
≤19	0	0
20-25	5	35.71
26-30	5	35.71
≥30	4	28.58
TOTAL	14	100
No of eggs retrieved	Frequency	%
1-5	1	7.14
6-10	1	7.14
11-15	3	21.43
16-20	5	35.72
21-25	1	7.14
≥26	3	21.43
TOTAL	14	100

pregnancies. The frequency distribution of the age, parity, BMI and the number of eggs retrieved from patients with moderate to severe OHSS are shown in Table 1. Fourteen (6%) of those who were stimulated developed moderate to severe OHSS

Table 2: Days on paracentesis and volume of ascitic fluid drained

Patients	Days on Paracentesis	Average volume(mls) of Ascites per day
A	18	2145
B	12	1990
C	9	3723
D	9	2280
E	8	2634
F	8	2246
G	8	3275
H	6	3475
I	5	1650
J	5	2440
K	5	2166
L	4	3090
M	4	1776
N	4	1478

and had a closed abdominal drain of the ascitic fluid, using the Bonanno catheter. Table 2 shows the number of days on abdominal paracentesis and the volume of ascitic fluid drained per patient. The average number of days of the abdominal drainage was 7.5 days and the average volume of ascitic fluid drained from a patient per day was 2454.9 ± 748 mls. The difficulties encountered with the use of the Bonanno catheter is shown in Table 3. Eight (57.14%) patients who had moderate to severe OHSS achieved clinical pregnancy (six intrauterine, one ectopic and one heterotopic pregnancy). Four patients (28.58%) had blocked Bonanno catheters and three of them (21.43%) had the catheter changed while the fourth had the catheter successfully flushed with normal saline into the peritoneal cavity. Four patients (28.58%) had the insertion site dressing changed due to soaking with ascitic fluid. One (7.14%) patient required the use of serum albumin. There was no incidence of injury to intra-abdominal organs or broken catheter. No case of OHSS had embryo transfer abandoned during the period under review.



Figure 1: Bonnano catheter sheath



Figure 2: Bonnano catheter pack

Table 3. Difficulties with the use of the bonnanno catheter

Difficulties	Number of Patients	%
Blocked catheter	4	28.58
Changed catheter due to blockage	3	21.43
Soaked dressing	4	28.58
Broken catheter	0	0
Inserted into viscera(visceral injury)	0	0

DISCUSSION

Ovarian hyperstimulation syndrome is a self-limiting condition and in the absence of a pregnancy, resolves within 10-14 days.^[11] In our study population, the average drainage period with the Bonanno catheter was 7.5 days (Range 4-18 days). The reported incidence of moderate ovarian hyperstimulation syndrome in IVF cycles is 3-6% while the severe form is 0.1-2%.^[12] During the study period, 6% of the patients who underwent IVF treatment developed moderate to severe OHSS.

Adhesion formation is the most common complication following peritoneal surgery and the leading cause of small bowel obstruction, inadvertent organ injury at reoperation.^[13] Therefore in choosing a site for needle entry, it is important to avoid areas around surgical scars as this can be associated with underlying bowel adhesion, increasing the risk of bowel injury. Visible veins should also be avoided because of the risk of hemorrhage. A point to remember is that the inferior epigastric artery traces from a point just lateral to the pubic tubercle, cephalad within the rectus sheath and is best avoided. Our choice of the left lower quadrant is based on the knowledge that the abdominal wall is thinner in this region compared with the infra-umbilical midline region.^[14] The multiple follicular cysts risk being punctured during the procedure. This will likely manifest as blood stained ascitic fluid which in our experience clears within 1 to 6 hours.

Al-Ramahi *et al* in 1997, first described three case reports involving the use of an indwelling peritoneal catheter for the drainage of ascitic fluid following the development of OHSS.^[15] Aboulgar and colleagues^[16] described 42 cases of severe OHSS in which the ascitic fluid was drained per vaginam by a transvaginal ultrasound scan guided approach. This approach unlike the abdominal approach using the Bonanno catheter would require repeated introduction of the aspiration needle with the potential risk of introducing infections.

Circulatory dysfunction may occur after large volume paracentesis and is associated with hypotension, hyponatremia and in severe cases, hepatorenal syndrome death.^[17] For this reason we always set

up an intravenous infusion of normal saline before commencing paracentesis for all patients with ascites following OHSS. An average of 2454.9 ± 748 mls of ascitic fluid was drained per day. Strict fluid input and output chart is vital to maintaining proper fluid balance. Occasionally, plasma expanders such as human albumin (200ml of 25% albumin over four hours) might be required, especially in cases where the daily output from the drain continues to rise over several days with associated low serum albumin. Only one patient (7.14%) required the use of serum albumin in our series. Albumin or other plasma expanders at the time of oocyte retrieval are not recommended for the prevention of OHSS.^[18] All the patients in our series became relieved and ambulant, despite the severity of the OHSS, within two hours of commencing the abdominal drainage. Soaked dressing can be a challenge and this can continue for up to 48 hours after the Bonanno catheter is removed. Four cases (28.58%) had blocked Bonanno catheters and three of them required replacements. Attempts were always made at flushing the catheter with 20-40mls of normal saline before considering catheter replacement if a free flow of ascitic fluid did not occur.

No case of intra-abdominal hemorrhage or peritonitis was recorded as a direct result of the procedure during the study period, although all the patients received 1gram of prophylactic intravenous Ampiclox injections before the commencement of drainage. There was a case where the ascitic fluid suddenly became blood stained after 12 days of catheter insertion with a positive pregnancy test. This was subsequently confirmed to be a heterotopic pregnancy and the patient underwent a laparotomy. While no case required readmission for recurrent or persistent OHSS following the removal of the abdominal drain, larger, controlled studies are required to determine the actual volume of ascitic fluid in 24 hours at which point the catheter can be safely removed. For now, we use an arbitrary volume of less than 1,000 ml in 24 hours.

CONCLUSION

It is recommended that all attempts be made at preventing the development of OHSS in all patients undergoing IVF. It is however suggested that the Bonanno catheter or

similar catheters be used in the few cases where ascitic fluid drainage is required.

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Conflicts of interest

There are no conflicts of interest

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