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Minimally invasive conservative management of ovarian torsion by hot dog in a bun technique: A case series

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Abstract
The study objective is to assess the efficacy of oopheropexy by hot dog in a bun technique as a conservative surgical management of ovarian torsion in preventing recurrence. This study includes 14 patients in the age group of 8 -33 who presented to the Gynaecology emergency department of Lifeline Multispeciality Hospital, Adoor, Kerala with acute abdominal pain. The study period was from August 2015 to August 2019. Ovarian torsion was suspected clinically and by ultrasound. Laparoscopic detorsion and oopheropexy (hot dog in a bun technique) with concurrent oopheropexy was done in all patients with ovarian torsion. Ovary was not salvageable in one patient for whom adnexectomy was done. Prophylactic contralateral oopheropexy was done in patients with long and lax infundibulopelvic and utero-ovarian ligament. Follow up was done with ultrasound for vascular flow and follicular activity. Laparoscopic detorsion and oopheropexy by hot dog in a bun technique is an effective technique in preventing recurrent adnexal torsion.

Keywords: Oopheropexy; plication; recurrent adnexal torsion; round ligament; utero-ovarian ligament

1. Introduction
Ovarian torsion refers to partial or complete rotation of the ovary on its ligamentous support often leading to interruption of its blood supply and some cases necrosis. It is one of the common gynaecological emergencies and affects females of all ages. If there is torsion of the fallopian tube along with the ovary, it is called adnexal torsion. Torsion of paraovarian and paratubal cysts may occur along with the ovary.
Ovarian torsion often occurs in the reproductive age women with associated pathology like ovarian/paraovarian cysts, polycystic ovaries or enlarged hyper stimulated ovaries after fertility treatment. In premenarchal and adolescent girls, torsion can occur with normal ovaries [1-4]. Ovarian torsion is a surgical emergency and prompt diagnosis and intervention is necessary to prevent loss of ovarian function and fertility.
The traditional treatment was adnexectomy for fear of embolism from the ovarian veins. Detorsion has now become an accepted treatment modality for ovarian torsion despite the bluish colour of the ovary. Oopheropexy after detorsion may be advocated for selected groups of patients.
We are presenting a case series of 14 patients for whom concurrent oopheropexy with the Hot Dog in a Bun technique [5] was done to prevent recurrent torsion.

2. Methods
This study was started in August 2015 after IRB approval. This is a prospective case study of 14 patients in the age group of 8 to 33 who have presented to the gynae emergency department of our institution from August 2015 to August 2019 with acute abdominal pain. Ovarian torsion was suspected clinically and substantiated by ultrasound. All women were managed conservatively with laparoscopy.
Veress entry was done through the umbilicus or palmars point (in patients with previous surgery) and pneumoperitoneum created. 5mm primary port was introduced at the same site, 2 ancillary trocars were inserted 2cm above the anterior superior iliac spine in the spino-umbilical line on either side. Detorsion was performed in all cases and the ovary observed for resumption of colour and vascularity. In cases where the blue-black colour of the ovary persisted, an

incision was made on the surface of the ovary to make out whether blood flow was present or not. Fresh ooze from the cut site was reassuring to conserve the ovary. Adnexectomy was deferred in cases where the ovary was salvageable and oopheropexy was performed.

The method used for oopheropexy was the hot dog in a bun technique (plication of utero- ovarian ligament to the round ligament) described by JD Kondrup *et al*. [5]. The suture was taken at two adjacent sites on the affected side in parous women. Oopheropexy with the same technique was done on the contralateral side in patients with risk factors or with long and hypermobile utero- ovarian and hypermobile infundibulopelvic ligaments. Intraoperative drain was used for cases where cystectomy was done and where the adnexa was grossly enlarged and edematous.

Follow up was done by Doppler ultrasound scan on 3rd postoperative day prior to discharge and monthly till the decrease in ovarian size and edema and resumption of follicular activity was documented. Postmenarchal adolescent group of patients were started on the conventional oral contraceptive pill to prevent cyst formation. Further follow up was done every 3 to 6 months as indicated.

3. Results

The patients in our case series belonged to the premenarchal, postmenarchal and reproductive age group. All except one patient presented with pain abdomen since 1 to 2 days with increased severity between 4 to 8 hours. Only one patient had intermittent pain for 1 week prior to exaggeration of symptoms.

Laparoscopic detorsion and oopheropexy was done for all except one patient who needed an adnexectomy. The number of adnexal twists was between 1 & 3. Only one patient had 4 twists. We were not able to correlate the number of twists to the degree of severity of pain because of the small number of cases. One patient had vasovagal shock and became pulse less in between due to pain and was resuscitated. Cystic lesions of the adnexa were noted in 8of 14 patients,2 were paraovarian cysts, 3 dermoid cysts and 3 simple ovarian cysts. The average size of the ovary was 10 to 12 cm. Concurrent cystectomy was done in all but one premenarchal girl. Dermoid cystectomy was done within an endobag and specimen retrieval was done through posterior colpotomy in 2 parous women and through a 10 mm umbilical incision for an adolescent girl. Simple ovarian and paraovarian cyst wall was retrieved through the ancillary ports. Cyst puncture was done for a premenarchal girl who had a 3cm ovarian cyst. Histopathological examination of the specimen showed 2 cases of benign cystic teratoma, 1 mucinous cystadenoma and 2 simple cysts. 2 cases were reported as ovarian infarction.

The colour of the twisted adnexa varied from blue to black. On detorsion the fallopian tube was noted to regain colour faster than the ovary. The average time for return of ovarian colour varied from 10 to 15 minutes during which time irrigation and inspection of the abdominal organs was performed. In 3 patients a cut on the surface of the ovary was made to note for fresh ooze.

Polycystic ovaries were noted in 5 of 14 patients and ovarian drilling was done for one patient with thick polycystic ovaries and primary infertility. There was one case of a small fundal pedunculated fibroid for which myomectomy was done. This patient had torsion of a normal adnexa. Prophylactic contralateral oopheropexy was done for 3 patients with long and lax infundibulopelvic and uteroovarian ligament. The intraoperative and demographic data are listed in the table.

The technique used for oopheropexy was Hot Dog in a Bun method described by JD Kondrup *et al.* where the round ligament is plicated to the utero-ovarian ligament passing through the mesosalpinx with the fallopian tube as the hotdog in between with 1-0 prolene. We used the suture technique at two adjacent sites on the affected side. The figures show the technique of the procedure. We had used vicryl in the first patient of our series. She presented with recurrence twice and we used non absorbable suture the second time. We have done all our subsequent cases with 1-0 prolene. Our case series is a small number to recommend the technique of using two sutures for plication. There was no recurrence in all cases where non absorbable suture was used. The size of the torted ovary took an average of 8 to 12 weeks to come back to almost normal size. Follicular activity was noted in all cases on the long term. Pregnancy was reported in 2 of our patients on follow up.

Table 1: Demographic characters, risk factors, intraoperative findings, surgery and follow up details

S. No	Case	Age	Risk factors	Parity	Site	Number of twists	Associated pathology	Surgery	Contralateral side	Follow up	Recurrenc
1	A	24	pcod	Para 1	Left Ovary and fallopian tube	3	_	Detorsion and bilateral oopheropexy	Oopheropexy	Doppler Ultrasound	3 months later
2	B	18	paraovarian Cyst		Left Ovary and fallopian tube	3	paraovarian cyst	Detorsion, cystectomy and left oopheropexy	–	Doppler Ultrasound	–
3	C	25	pcod		Left Ovary	1	fundal pedunculated fibroid	Detorsion, left oopheropexy and myomectomy,	–	Doppler Ultrasound	_
4	D	12	pcod, ovarian cyst		Right Ovary and fallopian tube	4	follicular cyst	Right salpingo- oopherectomy and left oopheropexy	Oopheropexy	Doppler Ultrasound	–
5	E	26	dermoid cyst	Para 1	Right Ovary and fallopian tube	2	dermoid cyst	Detorsion, cystectomy and right oopheropexy	–	Doppler Ultrasound	–
6	F	19	Dermoid cyst		Right Ovary and fallopian tube	2	dermoid cyst	Detorsion, cystectomy and bilateral oopheropexy	Oopheropexy	Doppler Ultrasound	_
7	G	8	follicular cyst		Left Ovary and fallopian tube	3	follicular cyst	Detorsion, cyst puncture and left oopheropexy	_	Doppler Ultrasound	_
8	H	13	_		Right Ovary and fallopian tube	2	_	Detorsion and bilateral oopheropexy	Oopheropexy	Doppler Ultrasound	–
9	I	33	ovarian cyst	Para 1	Right Ovary and fallopian tube	4	mucinous cyst	Detorsion, cystectomy and right oopheropexy	_	Doppler Ultrasound	_
10	J	21	Dermoid cyst		Right Ovary and fallopian tube	1	dermoid cyst	Detorsion,cystectomy, right oopheropexy and ovarian drilling	–	Doppler Ultrasound	–
11	K	14	Paraovarian		Left Ovary and	3	paraovarian cyst	Detorsion, cystectomy and left	_	Doppler	_

			cyst		fallopian tube			oopheropexy		Ultrasound	
12	L	14	Paraovarian cyst		Right Ovary and fallopian tube	1	Paraovarian cyst	Detorsion, cystectomy and right oopheropexy	-	Doppler Ultrasound	-
13	M	22	Paraovarian cyst		Right Ovary and fallopian tube	1	Paraovarian cyst	Detorsion, cystectomy and right oopheropexy	-	Doppler Ultrasound	-
14	O	30	pcod	Para 1	Right Ovary	2	-	Detorsion and right oopheropexy	-	Doppler Ultrasound	-

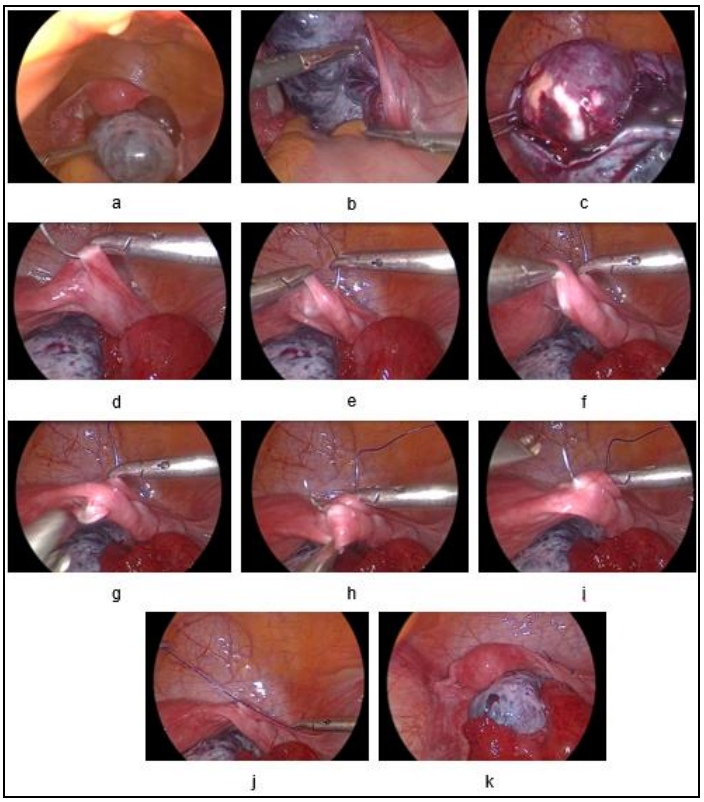

Fig 1: Hot dog in bun technique for adnexal torsion

a. Right adnexal torsion, b. Twisted pedicle, c. Dermoid cystectomy, Suture taken (anterior to posterior) successively through: d. Round ligament, e. Mesosalpinx, f. Utero ovarian ligament, Suture taken (posterior to anterior) successively through: g. Utero ovarian ligament, h. Mesosalpinx, i. Round ligament, j. Knot anteriorly, k. End of procedure Ovarian and tubal vascularity regained.

4. Discussion

Laparoscopic detorsion is increasingly resorted to for cases of adnexal torsion. Most of the cases in reproductive age women have been associated with cystic pathology mostly benign. Malignant and endometriotic lesions are less prone to torsion because of the associated adhesions. We have proceeded with cystectomy in all our presenting cases though there have been case reports where cystectomy was done as a second look procedure at a later date because of the associated edema and difficulty in peeling off the cyst wall. There is a possibility of recurrent torsion in the period awaiting second surgery, so we recommend concurrent cystectomy. This method will also enable evaluation of the specimen by histopathology.

Whether oopheropexy should be performed during the primary event or restricted to recurrent torsion is still a controversy. There are different methods of oopheropexy in the literature like fixing the ovary to the pelvic side wall [6], to the posterior abdominal wall [7], to the uterosacral ligament, plication of the uteroovarian ligaments [8], fixing the ovary to the round ligament [5] and a combined approach of fixation of the ovary and shortening the uteroovarian ligament [9].

We preferred the hot dog in a bun technique [5] for our cases where the round ligament is plicated to the uteroovarian ligament. This method appears to maintain the anatomic relationship of the uterus, tubes and ovaries. Preserving the tuboovarian relationship is important in the young and reproductive age group with fertility concerns. Care should be taken while tying the suture to avoid damaging the fallopian tube and selecting an avascular area in the mesosalpinx for taking the suture bite.

Prophylactic contralateral oopheropexy at the time of the primary event is also a controversy. Due to the limited number of cases where oopheropexy has been advocated, we do not have substantial evidence to recommend oopheropexy in all cases of adnexal torsion. Further the complications of oopheropexy may be under reported due to the limited number. Further studies are definitely required to make a strict recommendation. However, in our small group of patients, we have been able to prevent recurrent adnexal torsion by concurrent oopheropexy with the hot dog in a bun technique with non-absorbable suture.

5. Conclusion

A high degree of clinical suspicion aids in the early diagnosis of ovarian torsion. This will shorten the time interval between torsion and surgical intervention and prevent ovarian necrosis. Intraoperative assessment of the adnexa for restoration of vascularity after detorsion allows preservation of ovarian function and fertility. In doubtful cases where the colour of the ovary remains dark, consideration should be given for incising the ovarian surface to look for fresh bleed. Oopheropexy may be an effective method to prevent recurrent torsion. The complications of oopheropexy and adhesions are not well known and long-term studies maybe needed to make a recommendation for cases requiring unilateral or bilateral oopheropexy. This is to highlight the importance of attempting conservative management with laparoscopic detorsion and oopheropexy (Hot Dog in a Bun technique) before attempting oopherectomy to preserve ovarian and reproductive function in all cases of ovarian torsion.

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