Ovarian preservation with subcutaneous transposition in the setting of cytoreductive surgery

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ABSTRACT

INTRODUCTION: In recent years, cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC) has gained increasing acceptance as a treatment modality for peritoneal carcinomatosis. In female patients, this procedure involves a total hysterectomy and bilateral saphingo-oophorectomy to remove the pelvic peritoneum. We present a case of an unfortunate female adolescent with peritoneal carcinomatosis who underwent cytoreductive surgery and HIPEC. In view of the compelling circumstance, an innovative surgical technique was used to attempt ovarian preservation.

PRESENTATION OF CASE: A 14 year old girl with carcinoma of the sigmoid colon and peritoneal metastases was offered cytoreductive surgery and hyperthermic intra-peritoneal chemotherapy. In view of her age, ovarian preservation with subcutaneous transposition was performed during cytoreductive surgery. She is currently well 6 months post surgery and has resumed normal menstruation. We review the literature regarding ovarian preservation with subcutaneous transposition and discuss its benefit in pre-menopausal women undergoing peritonectomy and cytoreductive surgery for peritoneal carcinomatosis.

DISCUSSION: Subcutaneous transposition of the ovary in pre-menopausal patients requiring cytoreductive surgery spares them the sequelae of surgical castration. The subcutaneous location of the transposed ovary conveys advantages such as the ease of ultrasound surveillance and removal in event of disease recurrence. It also retains the possibility of future conception as the transposed ovary can easily be accessed for ovum extraction with assisted reproductive techniques.

CONCLUSION: Ovarian preservation with subcutaneous transposition is a technique worth considering in the treatment of pre-menopausal women who require cytoreductive surgery for peritoneal carcinomatosis.

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1. Introduction

Peritoneal carcinomatosis is an indicator of advanced tumor stage, disease progression or recurrence in malignancies of gastrointestinal origin. Regardless of primary tumor site, prognosis is uniformly poor. This is particularly so for tumors of gastrointestinal origin whereby median survival approximates six months. The conventional treatment of choice for patients with peritoneal carcinomatosis is palliative systemic chemotherapy. Surgery is usually reserved for selected patients and mainly for the purpose of symptom palliation. However, in recent years, cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC) has gained increasing acceptance as a treatment modality for selected patients with peritoneal carcinomatosis.1–4 CRS consists of several surgical procedures depending on the site of manifestation of peritoneal carcinomatosis. Surgery may include parietal and visceral peritonectomy, greater omentectomy, splenectomy, cholecystectomy, stripping of the liver capsule and bowel resection if gross disease is present on bowel surfaces. In female patients, this procedure invariably involves a total hysterectomy and bilateral saphingo-oophorectomy as the pelvic peritoneum is often involved by disease. Adequate cytoreduction thus entails removal of the female reproductive organs and the ovaries. We present a case of an unfortunate adolescent with peritoneal carcinomatosis who underwent cytoreductive surgery and HIPEC. In view of the compelling circumstance, we adopted an innovative surgical technique to attempt ovarian preservation in this young patient.

2. Presentation of case

A 14 year old girl presented in June 2011 with abdominal pain and irregular bowel habits of 4 months duration. She underwent a
colonoscopy and was diagnosed with adenocarcinoma of the sigmoid colon which she underwent laparoscopic anterior resection on 6/7/2011. Intra-operatively, several 2–3 mm nodules were seen in the peritoneal cavity which were left in situ (Fig. 1). The resected specimen’s histology was poorly differentiated adenocarcinoma of signet ring cell type with local invasion beyond the muscularis propria. 3 out of 4 lymph nodes were positive with no lymphovascular or perineural invasion. Resection margins were clear.

In view of peritoneal involvement, the patient was treated for metastatic disease and underwent palliative chemotherapy (FOLFOX and ERBITUX) from 8/8/11 to 19/9/11. Positron Emission Tomography (PET) scan performed post chemotherapy showed no evidence of any disease. During the course of treatment, the patient’s family did extensive research on her condition and came across the option of cytoreductive surgery. However, this was unavailable in the institution she was currently receiving treatment. Care was thus transferred to our tertiary institution for cytoreductive surgery (CRS).

Diagnostic laparoscopy performed on 4/10/11 showed nodules on the uterus and broad ligament with no other distant metastasis. Biopsies of the nodules revealed no malignancy. The case was discussed at the multi-disciplinary tumor board and decision was made to recommend peritoneectomy and hyperthermic intra-peritoneal chemotherapy (HIPEC). The patient and family were counseled on the possibility of a total hysterectomy and bilateral salpingo-oophorectomy during CRS and consented for the procedure.

Patient underwent peritoneectomy, bilateral salpingectomy, subcutaneous transposition of bilateral ovaries and HIPEC on 21/10/11. Intra-operatively, multiple nodules were found along the pelvic peritoneum but these had reduced in size after adjuvant chemotherapy. Frozen section from the pelvic nodules were positive for malignancy. Peritoneal nodules were also found involving the fallopian tubes but sparing the ovaries. Peritoneal carcinomatosis index was 3.

In view of the patient’s age, the disease free ovaries were preserved with its supplying gonadal vessels and transposed into the anterior abdominal wall subcutaneously (Figs. 2 and 3). Ovarian biopsies were not performed prior to the procedure.

Postoperative progress was uneventful. The patient tolerated diet on the 7th post operative day and received 2 cycles of intra-peritoneal chemotherapy. She was discharged well on the 13th post-operative day and has resumed her normal menses.

The patient represented with intestinal obstruction 2 months after discharge and laparotomy revealed intestinal obstruction secondary to adhesion bands. 2 small pelvic nodules were also noted at the sigmoid mesentery. Adhesiolysis was performed and the peritoneal nodules were biopsied. The patient’s intestinal obstruction resolved after adhesiolysis but histology from the pelvic nodules revealed metastatic adenocarcinoma. She is currently undergoing further palliative chemotherapy and was well on clinic review 6 months after the CRS was performed.

3. Discussion

In recent years, cytoreductive surgery and hyperthermic intra peritoneal chemotherapy has gained acceptance as a treatment modality for selected patients with peritoneal carcinomatosis. CRS in pre-menopausal women involves ovariectomy and patients suffer sequelae like climacteric symptoms, osteoporosis and an increased risk of cardiovascular disease. These patients may benefit from ovarian preservation if disease clearance is not compromised. We present the only case report to our knowledge that describes ovarian preservation in the setting of CRS.

The surgical procedure performed for this patient was as follows. Following division of the utero-ovarian ligament, the infundibular pelvic ligament was carefully dissected free, taking care to avoid injury to the ureter and ovarian vessels. The pedicle of the ovarian vessels on each side was isolated and dissected free of the peritoneal attachments. The subcutaneous site of ovarian transposition was identified and an incision made over the skin and fascia. Each ovary was then gently pulled through the incision

Fig. 1. Peritoneal nodules present during laparoscopic anterior resection.

Fig. 2. Ovary preserved and hitched onto the subcutaneous layer.

Fig. 3. Picture after preservation and subcutaneous transposition of bilateral ovaries.
and tagged to the fascia using absorbable vicryl stitches before skin closure.

Subcutaneous transposition of the ovary in this young patient spares her the sequelae of surgical castration and conveys other advantages. The subcutaneous location of the transposed ovary is amenable to ultrasound surveillance for any subsequent ovarian pathology. In the event of disease recurrence in the ovary, its subcutaneous location ensures easy removal of the transposed ovary without having to breach the peritoneal cavity. It also retains the theoretical possibility of conception in future as the transposed ovary can easily be accessed for ovum extraction if assisted reproductive techniques are desired in future although this would require a surrogate pregnancy.

Ovarian exteriorization was first described by Kovacev in the setting of carcinoma of the cervix. A major drawback of this technique was the risk of intestinal herniation and post operative adhesions, an unfortunate complication encountered by our patient in the case vignette. Fujiwara et al. has proposed a modification of this method by using the retro-peritoneal space as the route to approach the abdominal subcutaneous fat. This may help minimize the risk of intestinal herniation or post-operative adhesions. The method has been successfully utilized in 27 patients with no major complications of intestinal obstruction reported and may be the preferred option if ovarian preservation was to be attempted.

There have been few publications reporting the long term ovarian function after subcutaneous transposition of the ovary. The same institution which pioneered the retroperitoneal approach for subcutaneous ovarian transposition reported that although ovarian function declined post subcutaneous transposition, transposed ovaries in postmenopausal women still secrete estrogen equivalent to that provided by hormone replacement therapy. In contrast, Guo et al. reported normal short-term and long-term endocrine function post subcutaneous ovarian transposition. Although data regarding this uncommon surgical procedure remains limited, the available literature seems to suggest that it at least results in hormonal levels comparable to that provided by hormone replacement therapy.

The question of whether reproductive potential is preserved post subcutaneous ovarian transposition remains unanswered. There have been no case reports to our knowledge which describes successful conception post subcutaneous ovarian transposition. In the current era of reproductive medicine, other viable alternatives for this patient include cryopreservation of oocytes and ovarian tissue. These should ideally be performed prior to the initiation of chemotherapy to optimize the quality of oocytes retrieved.

Oocyte cryopreservation may be performed for both mature and immature oocytes. In the latter scenario, the immature oocytes are required to undergo in vitro maturation either prior to freezing or after thawing. Another alternative for fertility preservation is ovarian tissue cryopreservation with future implantation. Similar to subcutaneous ovarian transposition, this technique has the added advantage of preservation of ovarian hormonal function and spares pre-menopausal women the adverse effects of ovarian castration. This technique has led to 13 successful live births in a recently published case series. From a theoretical view point, fertility results from subcutaneous ovarian transposition should be superior to that of transplantation of cryopreserved ovarian tissue. It preserves the endogenous vascular supply of the ovary and minimizes damage to the ovarian tissue during freezing and thawing which has been shown in animal studies to cause significant loss in follicles due to ischemic damage. Thus, while evidence supporting subcutaneous ovarian transposition remains limited, it is a technique worth considering in the treatment of young pre-menopausal women requiring peritoncectomy and cytoreductive surgery for peritoneal malignancy.

4. Conclusion

Ovarian preservation with subcutaneous transposition is a technique worth considering in the treatment of pre-menopausal women who require cytoreductive surgery for peritoneal carcinoma.

Conflicts of interest statement

There are no conflicts of interest.

Role of funding source

No funding was required for this case report.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

All contributed.

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