



Nerve sparing excision of gastrohepatic ligament lesion as part of cytoreductive surgical management of advanced ovarian malignancy

Sarah Louise Smyth[^], Aakriti Aggarwal[^], Hooman Soleymani majd[^]

Department of Gynaecological Oncology, Churchill Cancer Centre, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

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Correspondence to: Mr Hooman Soleymani majd, MD, MRCOG. Department of Gynaecological Oncology, Churchill Cancer Centre, Oxford University Hospitals NHS Foundation Trust, Old Road, Headington, Oxford OX3 7LE, UK. Email: hooman.soleymanimajd@msd.ox.ac.uk.

Abstract: Metastases to the lesser sac (also known as the omental bursa) and its contents are frequently seen in advanced ovarian cancer. This would require a thorough and meticulous intra-operative surgical exploration and mapping for patients requiring radical supracolic omentectomy requiring sacrifice of the gastro-epiploic arcade. We describe an educational surgical technique with maximum effort to preserve the right and left gastric arteries, when the right and left gastro-epiploic arteries and short gastric arteries are divided. These steps are demonstrated with attention to anatomical landmarks of the lesser sac to minimise intraoperative and postoperative morbidity. This surgical approach will not only spare the gastric branches of the vagus nerve (rami gastrici) but also prevent gastric ischaemic changes. We describe the case of a 77-year-old female patient diagnosed with stage 3C high grade serous ovarian/tubal cancer on the neoadjuvant chemotherapy pathway, undergoing delayed debulking surgery. The gynaecological oncology surgeon should confidently hold detailed knowledge of upper abdominal anatomy in their armamentarium, to maximise the safety and efficacy of ultra-radical surgery to achieve R0 (no residual disease); which is a single independent risk factor for survival. This video demonstrates a challenging case with an undesirable location of metastatic disease requiring advanced upper abdomen surgical skills and knowledge, with specific consideration of intraoperative multidisciplinary decision-making.

Keywords: Lesser sac; omental bursa; cytoreduction; gastrohepatic ligament; ovarian cancer

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Introduction

The primary goal of surgical management of advanced ovarian malignancy is to achieve complete cytoreduction, with no residual disease (also known as R0). This requires mastery of anatomical landmarks, in addition to surgical techniques. Subspecialists should hone their abilities

in handling surgical difficulties, such as uncommon metastatic disease sites, while averting post-operative morbidity and possible side effects including damage to nearby tissues, nerves, and veins (1,2). Literature reports suggest that lesser sac metastases are present in up to two-thirds of advanced ovarian cancer cases (3). Suboptimal cytoreduction is often a consequence of inadequate intra-

[^] ORCID: Sarah Louise Smyth, 0000-0001-7407-8247; Aakriti Aggarwal, 0000-0002-1491-7704; Hooman Soleymani majd, 0000-0003-3293-5321.

operative surgical mapping and not appreciating the disease burden. Hence, the lesser sac is recognised as one of the potentially neglected areas during ultraradical ovarian cancer surgery (4). Consequently, there have been various techniques reported to enable the gynaecology oncology surgeon to tackle this challenge (5,6). Amongst these are raising the stomach and carefully retracting the caudate lobe of the liver, to reveal the posterior surface of the supragastric lesser sac, which is made up of a double peritoneal layer. We have demonstrated a surgical technique to excise a gastrohepatic ligament lesion with emphasis on avoiding the vagal nerves and important blood vessels forming the gastric blood supply, as described below.

Our technique will be particularly helpful when a gastrohepatic ligament lesion is encountered following

Highlight box

Surgical highlights

- This technique re-emphasizes the value of careful attention to the omental bursa, its contents and surroundings namely the pancreas, gastrohepatic ligament (also known as lesser omentum), gastric blood and nerve supply, left kidney, adrenal gland, spleen and caudate lobe of the liver while excising metastatic lesions using an advanced energy device.
- Lesser sac metastases are common in advanced ovarian cancer and pose extra surgical challenges.

What is conventional and what is novel/modified?

- We present a surgical technique to excise a gastrohepatic ligament metastases with emphasis on avoiding the vagal nerves (anterior and posterior gastric plexuses) and to preserve at least 2 out of 5 major gastric blood vessels.
- Previous techniques have described ventral mobilization of the stomach and careful retraction of the caudate lobe to reveal the posterior surface of the supragastric lesser sac, which is composed of a double peritoneal layer.
- When intra-operative surgical mapping identifies both metastases to greater and lesser omentum, the surgeon should be mindful of the gastric blood supply before sacrificing the gastroepiploic arcade and short gastric arteries.
- In this approach, the surgeon uses an advanced energy device to excise the gastrohepatic ligament lesion while carefully avoided vessels along the lesser curvature of the stomach.

What is the implication, and what should change now?

- The primary benefit of this approach is to achieve no residual disease without compromising the gastric nerve and blood supply, thereby avoiding intra-operative ischaemia and post-operative gastroparesis.



Figure 1 Computed tomography imaging of chest/abdomen/pelvis demonstrating widespread mesenteric and peritoneal nodularity despite neoadjuvant chemotherapy.

supracolic omentectomy as part of ultraradical debulking in the surgical management of ovarian cancer. We present this article in accordance with the SUPER reporting checklist (available at <https://tcr.amegroups.com/article/view/10.21037/tcr-24-950/rc>).

Preoperative preparations and requirements

This video demonstrates the excision of a gastrohepatic ligament lesion in a 77-year-old female patient, with a previous medical history of right renal cell carcinoma (treated with nephrectomy) for which she was undergoing surveillance imaging (*Figure 1*). Investigations revealed a 13-mm umbilical nodule and multiple mesenteric and peritoneal nodules on computed tomography scan, with an elevated cancer antigen 125 (CA125) of 2,644 IU/mL. Image guided biopsy (of a nodule) confirmed high-grade serous carcinoma warranting multidisciplinary team discussion and subsequent neo-adjuvant chemotherapy (NACT). After 6 cycles of NACT she had stable disease and underwent a two-stage surgery; exploratory laparoscopy in the first instance, to assess the feasibility of radical cytoreductive surgery (7). She had full pre-operative work up including a cardio-pulmonary exercise testing to gauge her anaerobic threshold. The preoperative preparation is outlined in *Table 1*. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent for teaching, training and research was obtained from the patient prior to surgery.

Table 1 Procedure materials

Procedure materials and preoperative preparation

Positioning

The patient is placed in modified Lloyd Davis position with the gluteal fold at the end of the table to allow access to the perineum

Draping

Abdominal skin preparation from mid chest to mid thighs

Under buttocks, legs, sides, top and bottom

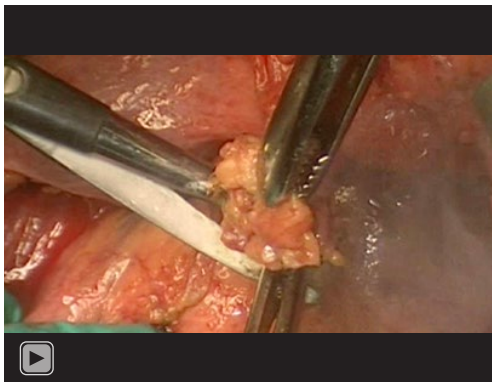
Vaginal preparation & Foley's catheter insertion

Instruments

Bookwalter Retractor system

Ethicon bipolar scissors (energy set to 60 units)

Russian tissue forceps



Video 1 Excision of gastrohepatic ligament lesion using Ethicon bipolar scissors and Russians forceps with preservation of the right and left gastric arteries and the vagal nerves of Latarjet.

Step-by-step description

At laparotomy, extensive pelvic and peritoneal disease was found, involving the right and left hemi-diaphragm, bladder surface, small and large bowel mesentery and rectosigmoid. The surgeon proceeded to perform *en-bloc* modified radical total abdominal hysterectomy, bilateral salpingo-oophorectomy, pelvic and bladder peritonectomy with concomitant rectosigmoid resection and colostomy formation/Hartmann procedure, bilateral pelvic lymph node assessment and excision of enlarged nodes, radical total omentectomy (including the gastrocolic ligament),

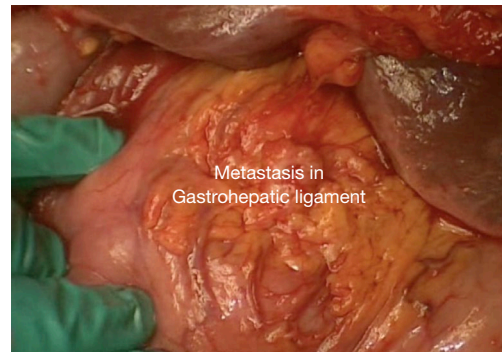


Figure 2 Gastrohepatic ligament lesion—a site of ovarian metastatic disease.

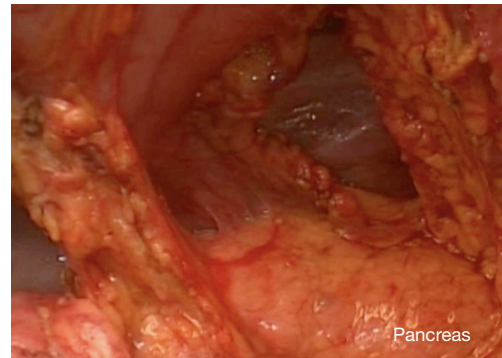


Figure 3 Dorsal view of surrounding structures following excision of gastrohepatic ligament lesion.

appendectomy, mesenteric resection of the small and large bowel, umbilical nodule resection, type three liver mobilisation (6) and peritonectomy of the diaphragm, Morrison's pouch, anterior abdominal wall, paracolic gutters, and pouch of Douglas. With careful attention given to the surrounding structures of the pancreas, omental bursa and posterior aspect of the gastrohepatic ligament (both regarding evidence of disease and risk of trauma), this lesion was then excised using an advanced energy device (*Video 1*, *Figures 2,3*). The procedure steps are also detailed in *Table 2*.

Postoperative considerations and tasks

Final histology confirmed stage 3C high-grade serous carcinoma of tubal origin. The patient received routine multidisciplinary postoperative care on the ward. The patient eventually made good recovery and there were no significant post-operative complications.

Table 2 Procedure summary

Step-by-step description for completion of procedure in achieving complete cytoreduction

Ensure adequate access to the upper abdomen

High midline laparotomy

Bookwalter Retractor insertion

Assessment of anatomy

Identification of vascular supply to stomach

Identification of vagal trunk

Identify margins of gastrohepatic ligament lesion

Posterior ligament wall

Pancreas

Omental bursa

Lesser curvature of the stomach

Liver edge and portal triad

Completion of radical total omentectomy

Preservation of adequate neurovascular supply

Right gastric artery—branch of common hepatic artery

Left gastric artery—branch of coeliac trunk

Nerve of Latarjet—branch of posterior vagal trunk

Application of forceps and bipolar scissors to create window in gastrohepatic ligament

Lift/mobilize stomach ventral, increasing the distance from dorsal structures

Ensure appropriate macroscopic margins to achieve complete resection

Recheck surrounding structures for potential injury

Check haemostasis

Tips and pearls

- ❖ Unusual locations of metastatic disease can present challenges both in diagnostics and treatment;
- ❖ Advanced knowledge of anatomical landmarks and surgical techniques are of paramount importance in consideration of approach;
- ❖ During excision, acknowledge surrounding structures including the pancreas and omental bursa;
- ❖ Ensure the left gastric, common and left hepatic arteries and the vagal nerves are preserved (stomach lesser curve);

- ❖ Evaluate intraoperative multidisciplinary team decision-making regarding operative morbidity in the quest for zero residual disease.

Discussion

The right and left gastric arteries and the vagal nerves, which run along the lesser curvature of the stomach, were preserved—whilst excising the gastrohepatic lesion (1,2). The main advantage of this technique is the avoidance of vital blood vessels and the vagal nerve supply, thus reducing the short and long-term complications of this procedure. The potential limitation may be in the case of a metastatic lesion identified near the essential structures preserved in this procedure, highlighting the importance of understanding surgical anatomy and careful intraoperative assessment. Here, we present a complex case that calls for highly skilled surgery, with particular attention to intraoperative multidisciplinary decision-making about operational morbidity (8). It is worth noting that in this case, supracolic omentectomy was not undertaken prior to identification of the metastatic lesion in the gastrohepatic ligament (also known as the lesser omentum). This was fully evaluated and the lesion identified prior to sacrificing the gastroepiploic arcade and short gastric arteries as part of the supracolic omentectomy. As these vessels form the major blood supply to the greater curvature of stomach, it becomes pertinent to preserve the left gastric artery (arising from coeliac trunk) and the right gastric artery (branch of hepatic artery proper). If the anterior vagus nerve is sacrificed due to extensive lesser omentectomy, all efforts should be made to preserve the posterior vagal trunk (9). After extensive lesser omentectomy test the pylorus for patency. If you are able to pass your thumb and index finger around the pylorus there is no need for a pyloroplasty; if it is stenotic, then a pyloroplasty is indicated. In this video, we demonstrate how the surgeon carefully avoided these arteries as well as the vagal nerves and its branches along the lesser curvature of the stomach; we present this modification in our surgical video.

Conclusions

Lesser sac metastases present a challenge to completion of complete cytoreductive surgery in ovarian cancer, especially if these are discovered subsequent to the supracolic omentectomy procedure. This calls for careful attention

to the vital blood and nerve supply in this anatomical area. This video demonstrates a challenging case with an unusual location of metastatic disease requiring advanced upper abdomen surgical skills and knowledge, with specific consideration to intraoperative multidisciplinary decision-making.

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Footnote

Reporting Checklist: The authors have completed the SUPER reporting checklist. Available at <https://tcr.amegroups.com/article/view/10.21037/tcr-24-950/rc>

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent for research, teaching and training on this surgical technique and accompanying video/images was obtained from the patient.

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