

Laparoscopic Lymph Node Biopsy: Efficacy and Advantages

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ABSTRACT: **Background:** Diagnosis of abdominal lymphadenopathy is challenging when not accompanied by peripheral lymphadenopathy. Computed tomography-guided core-needle biopsy has largely replaced open procedures in recent years, but this approach is limited by access to the anatomic region and the amount of tissue acquired.

Objectives: To demonstrate the feasibility of the laparoscopic approach in obtaining abdominal lymph node biopsies and to evaluate the diagnostic adequacy of the technique.

Methods: We reviewed the data of patients who underwent laparoscopic lymph node biopsy between 2004 and 2014 in our department. Demographics, intra-operative parameters and postoperative course were examined, as were histological reports. Postoperative complications were categorized according to the Clavien-Dindo (CD) classification.

Results: Between 2004 and 2014, 57 laparoscopic biopsies were performed for intra-abdominal lymphadenopathy. One case was a repeated attempt due to limited histologic material. The mean age was 49.5 ± 19.6 years. There were two conversions to open laparotomy, one due to small bowel injury and the other due to a sizable mass. Overall, 56 cases had full clinical data: 48 cases (85.7%) had CD = 0, six (10.7%) had CD = 1. There was one postoperative severe complication (CD = 3) and one mortality (CD = 5), which was related to preexisting hepatic insufficiency. Mean hospital stay was 1.6 days. Overall, adequate tissue samples were acquired in 96.7% and only 3 of these cases resulted in inconclusive diagnoses.

Conclusions: Laparoscopic lymph node biopsy is a viable alternative to the currently available methods of tissue retrieval. It provides an access for nodes which are inaccessible percutaneously, and may allow a superior diagnostic yield.

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accessible source, diagnostic tissue is more difficult to obtain and a more invasive intervention may be required.

Until the 1980s, open surgery represented the only approach to sample abdominal lymphadenopathy. Later, image-directed minimally invasive techniques, such as ultrasound or computed tomography (CT)-guided percutaneous biopsies, were preferred because of their low morbidity and acceptable diagnostic yield [1-5].

CT-guided core-needle biopsies, whenever feasible, are preferred due to their minimal associated morbidity. Not infrequently, though, the retrieved material is inadequate for an accurate diagnosis due to structural changes. Moreover, in patients suspected to have lymphoma, needle biopsy often fails to provide an adequate tissue specimen to allow special tests for accurate sub-classification. Furthermore, some nodes are in proximity to major blood vessels or viscera, and needle biopsy may be impossible or too risky.

Laparoscopic lymph node biopsies emerged as a viable alternative for abdominal lymph node sampling, offering the advantages of a minimally invasive tool, with the benefit of surgical biopsy, allowing both an accurate and large enough sample size [6,7]. The objectives of this study were to demonstrate the feasibility of the laparoscopic approach in obtaining abdominal lymph node biopsies and to evaluate the diagnostic adequacy of the technique.

PATIENTS AND METHODS

DATA COLLECTION

Medical records of patients who underwent laparoscopic lymph node biopsy between 2004 and 2014 in the Department of General Surgery and Transplantation were reviewed from a prospectively maintained database. Demographic data as well as clinical, operative and postoperative parameters were recorded. Histological reports were reviewed to determine the yield of the procedure. Postoperative complications were categorized according to the Clavien-Dindo (CD) classification [8].

SURGICAL TECHNIQUE

All patients were operated in the supine position under general anesthesia and with endotracheal intubation. For upper

Abdominal lymphadenopathy is a frequent manifestation of both inflammatory and malignant conditions, and a lymph node biopsy may be needed to establish the diagnosis. In some cases, there are associated enlarged peripheral lymph nodes, which may be amenable to biopsy, often performed under local anesthesia. However, in the absence of a readily

abdominal pathologies the patient's legs were spread, allowing the surgeon to stand between them.

A standard laparoscopic technique was used in all cases. Pneumoperitoneum was established with a Veress needle placed at the sub-umbilical site and maintained with CO₂ insufflation at 15 mmHg. The Veress needle was then replaced with a 5 or 10 mm trocar as a viewing port. A 30 degree-angled laparoscope was used in the laparoscopic exploration. In most cases, two 5 mm ports were inserted under laparoscopic guidance to achieve optimal triangulation. In a few cases another 5 mm operating port was inserted to assist in tissue exposure.

A thorough investigation of the abdominal cavity, lesser and greater omenti, small bowel and mesentery was performed. Location of the lymph node sampling was based on preoperative CT imaging and the intra-operative investigation. The specimen was excised using electrocautery or with the aid of ultrasonic shears to minimize bleeding. The enlarged nodes were either completely or partially excised based on their size, mobility and presence of adjacent structures. The specimens were removed using a specimen bag created from a finger-glove [9] cut from a #8 latex glove allowing removal through a 5 mm abdominal port site. In cases where a Hasson cannula was used, the fascial wound was closed using a Vicryl® 0 suture (Ethicon, New Brunswick, NJ, USA). The specimens were sent for histological analysis as fresh tissue.

RESULTS

Between 2004 and 2014, we performed 57 laparoscopic biopsies for intra-abdominal lymphadenopathy. Case characteristics are displayed in Table 1.

In all but five cases, preoperative imaging (abdominal ultrasound scan and/or CT) identified the site of lymphadenopathy. In the remaining five cases, which presented with chronic right lower abdominal pain and normal imaging studies, mesenteric lymph nodes were identified and sampled as part of a diagnostic laparoscopy. None of the cases had palpable peripheral lymph nodes suitable for biopsy.

Postoperative complications are detailed in Table 2. Most of the cases (85.7%) did not have any complications (CD = 0). The most common complication (i.e., CD > 0) was fever 0–1 days post-surgery (10.7% of procedures). In two cases (3.5%) a conversion to open laparotomy was required. In one of the cases the size of the mass did not allow for safe laparoscopic sampling and a small midline incision was done. In the other case iatrogenic duodenal injury mandated conversion to open repair. There was one postoperative death (CD = 5), which was related to a complication resulting from the primary disease (hepatic insufficiency). Mean overall hospital stay was 1.6 ± 3.3 days and 1.1 ± 0.7 days for cases without major complications (CD < 3a).

The two most common histologic diagnoses were reactive lymphadenopathy, occurring in 20 cases (35.1%), and lym-

phoma (diagnosed in 19.3% of the cases), the most prevalent types being follicular and B cell lymphoma. Other diagnoses included sarcoidosis and other non-necrotizing granulomatous pathologies. Adequate tissue samples were acquired in 54 of 56 primary procedures (96.4%) as well as in the repeated attempt. Three cases were non-diagnostic despite adequate sized samples, two of which showed extensive fibrosis/necrosis and one case that had an atypical cell population with inconclusive fluorescent in situ hybridization and polymerase chain reaction studies [Table 3].

Table 1. Case characteristics of 57 diagnostic laparoscopies

Case characteristics	
n	57
Male to female ratio	27:30
Age (years)	49.5 ± 19.6
No. of lymph nodes sampled	1.51 ± 0.71
Conversion rate	2/57 (3.5%)
Length of hospital stay (days)	1.6 ± 3.3 days
Missing histologic data	1/57 (1.7%)
Histologic diagnosis	54/56 (96.4%)
Insufficient tissue	2/56 (3.6%)

Table 2. Operative and postoperative complications of 57 diagnostic laparoscopies for abdominal lymphadenopathy

Location	Clavien-Dindo classification						Missing data
	0	1	2	3	4	5	
Mesenteric	11	2				1	
Root of mesentery	11	1					
Peri-portal	7	2					
Retroperitoneal para-aortic	3			1			
Retroperitoneal iliac	11						
Pelvis	2						
Omentum	2	1					
Missing data	1						1
Total (n = 57)	48	6		1		1	1

Table 3. Case histology

Histology diagnosis	n	%
Normal (no evidence of disease)	6	10.5%
Reactive	20	35.1%
Lymphoma	11	19.3%
Other	14	24.6%
Inconclusive diagnosis	3	5.3%
Inadequate tissue sample	2	3.5%
Missing data	1	1.8%
Total	57	100.0%

DISCUSSION

Abdominal lymphadenopathy is a diagnostically challenging condition that may signify abdominal lymphoma, metastatic disease, tuberculosis, sarcoidosis, or non-specific inflammation. In order to achieve a correct diagnosis and accurately classify lymphoma, if present, it is necessary to adequately sample the suspicious lymph nodes.

Although in the case of peripheral lymph nodes a biopsy can be performed easily even under local anesthesia with minimal morbidity, an intra-abdominal lymphadenopathy represents a more complex problem. In the past, abdominal lymphadenopathy raising suspicion of lymphoma frequently required exploratory laparotomy to obtain a proper lymph node biopsy [10]. In order to decrease morbidity, image-guided needle biopsies under ultrasound or CT began being used in the past 30 years.

Each of the techniques has its own strengths and weaknesses. The percutaneous technique is limited by the amount of tissue achieved by the needle, even if passed more than once, which may not prove sufficient for a complete and thorough pathologic analysis, especially in the diagnosis of lymphoma, which may require multiple assays. Previously published data show the diagnostic yield of image-guided core-needle biopsy to be 68.9 to 89.4% in diagnosis of lymphoma [11-13] and similar yields were described for the diagnosis of abdominal lymphadenopathy using fine-needle biopsy/aspiration [14,15]. Another limitation is the associated technical difficulty and patient risk if the lymph node is in the vicinity of vital structures. Although formal laparotomy has proven superior in diagnostic rate, the associated morbidity is never negligible.

The efficacy of diagnosis in our series was calculated to be 96.4%, which correlates and supports the findings of Casaccia and colleagues [6] in a series of 32 cases of laparoscopic lymph node biopsy that had 97% diagnostic success.

In our study the conversion rate was 3.5% owing to a large-sized abdominal mass in one case and an iatrogenic duodenal injury in the other. In the study of Asoglu et al. [16] 17% of diagnostic laparoscopies for suspected primary or recurrent lymphoma required conversion, mostly due to inadequate exposure. While major complications were not statistically different in our study, a better diagnostic efficacy was seen in their study as none of the cases (n=94) failed to provide sufficient tissue samples. This noteworthy high success rate can probably be attributed to their repeated use of intra-operative frozen section examinations, which allowed real-time feedback to the operating team regarding the adequacy of their samples.

In light of these efficacious results, general safety and faster patient recovery, it seems reasonable to suggest that laparoscopic lymph node biopsy replace open laparotomy as a definite procedure for diagnosis of intra-abdominal lymphadenopathy, mainly in cases suspicious for lymphoma. The place of other minimally invasive techniques such as image-guided biopsy is

still secure as part of the complete armamentarium used for minimally invasive tissue sampling.

CONCLUSIONS

Laparoscopic lymph node biopsy is an effective procedure, with high diagnostic yield, short hospitalization period and low rate of complications. This method may be considered the procedure of choice for patients with intra-abdominal lymph node enlargement that requires a biopsy for diagnosis, especially in cases suspected of lymphoma.

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