

A Review of the Role of Laparoscopic Biopsy in Cases of Abdominal Lymphadenopathy

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Abstract

Lymphadenopathy, identified incidentally during computed tomography, is a common clinical scenario faced by clinicians, and often poses a diagnostic challenge mandating a tissue diagnosis. In the absence of palpable peripheral nodes, tissue has to be obtained from the abdominal nodes by image guided biopsy or surgery. In this context, a laparoscopic biopsy avoids the morbidity of a laparotomy.

Keywords: Abdomen, Biopsy, Laparoscopy, Lymph node, Lymphoma, Tuberculosis.

INTRODUCTION

The lymphatic system is an important component of the immune system. It includes lymphatic fluid, lymphatic vessels, lymph nodes, spleen, tonsils, adenoids, Peyer's patches, and the thymus.¹

Lymph nodes are composed of follicles and contain an abundance of lymphocytes. Lymph is filtered through the lymph node sinuses where particulates and infectious organisms are detected and removed. Because of the exposure to immune challenges, antibody and cell immunity is mediated. As a result of such normal processes, the lymph nodes can enlarge by proliferation of normal cells or infiltration by abnormal cells.

Lymphadenopathy is defined as the enlargement of one or more lymph nodes as a result of normal reactive effects or a pathologic occurrence. While size is the most common reference, others include an abnormal number or alteration in consistency as a pathologic change that requires investigation.¹

Currently, computed tomography (CT) is increasingly widely utilized for vague abdominal symptoms due to its high sensitivity. The result of this technological trend is an increased incidence of unexpected retroperitoneal and mesenteric lymphadenopathy. The diagnosis of mediastinal and intra-abdominal lymphadenopathy is sometimes difficult, especially in patients without any other primary lesions and without any specific serological findings. This may be caused by primary lymphoproliferative disorders, metastasis, sarcoidosis, tuberculosis and so on.² Until recently, enlarged lymph nodes identified on CT scan have usually required open biopsy through a laparotomy incision. As technology has improved, CT/ultrasound-guided fine-needle aspiration

(FNA) or core biopsy has developed into dependable and minimally invasive alternatives for acquiring tissue. Oftentimes, however the tissue obtained is not sufficient for histological evaluation or the location of the adenopathy is not amenable to a CT/ultrasound (US)-guided biopsy.³⁻⁶ While laparotomy remains the gold standard for retroperitoneal lymph node biopsy, it is an invasive procedure associated with prolonged hospital stay and subsequent recovery time. The laparoscopic approach to adenopathy offers the potential benefit of decreased recovery time and postoperative morbidity compared with open techniques as well as increased likelihood of obtaining adequate tissue.

AIM

This is a retrospective analysis of laparoscopic biopsy of abdominal lymph nodes. The objective of this study is to assess the safety, efficacy, and diagnostic accuracy of laparoscopic biopsy.

MATERIALS AND METHODS

It is a retrospective review of 87 cases from four different sources:

1. From January 1999 to June 2001, 19 laparoscopic biopsies were performed for 18 patients with intra- or retroperitoneal lymphadenopathy at Ospedale San Martino di Genova, Genova. In 15 patients, the biopsy was performed in order to achieve the diagnosis. In the other four cases, laparoscopic biopsy was required to confirm a relapse or the evolution of a lymphoma during treatment or follow-up.⁷
2. This study evaluated all patients undergoing laparoscopic retroperitoneal lymph node biopsy from 2001 to 2007

at the Cleveland Clinic. Patient records were retrospectively reviewed for age, sex, pathologic diagnosis, conversion to laparotomy, and perioperative complications. A total of 30 cases were reviewed. In this group, 67% were males and 33% were females; mean age was 48 years. Ten patients underwent mesenteric lymph node sampling and 20 (67%) underwent retroperitoneal tumor resection.⁸

Data collected from patient charts, which included demographics, conversion rates, ability to obtain adequate tissue for pathologic evaluation, and treatment based on biopsy results were evaluated. Preoperatively, all patients underwent a CT of the abdomen which was used for evaluation of the location and extent of the adenopathy and operative planning. If deemed appropriate by radiology, CT/US-guided biopsies were attempted prior to any consideration of surgical intervention. In multiple cases, pathology was determined based on such core biopsies. If image guided biopsy was unsuccessful in establishing a diagnosis then surgical intervention was recommended. Preoperatively, all patients were carefully examined in order to evaluate for any palpable lymphadenopathy which may have been approached much more easily, such as in the axillary or inguinal regions. CT scans were also carefully reviewed with staff radiologists in order to optimize our operative approach. Surgical plans were discussed at length with the patients and consent was obtained.

3. Between October 2000 and November 2005, 28 patients with abdominal lymphadenopathy underwent laparoscopic biopsy at PD Hinduja Hospital, Mumbai, India. Preoperative radiological imaging studies had identified a nodal mass in 20, a solitary node in 1, a cold abscess in 1, and a mesenteric cystic lesion in 1 patient. In five patients with chronic right lower abdominal pain and normal ultrasonographic findings, mesenteric nodes were identified and biopsied during diagnostic laparoscopy.⁹

There were nine men and 19 women with a median age of 27 years (range 6-77 years). The presenting features included chronic abdominal pain (7), pain, weight loss and fever (10), pain and weight loss (3), abdominal lump (2), pyrexia of unknown origin (5), and backache (1). None of these patients had palpable peripheral lymph nodes suitable for biopsy. In 23 patients, preoperative ultrasound scan and/or computerized tomography scan had identified the site of lymphadenopathy. One patient was shown to have a lesion suspected to be a mesenteric cyst. Ten patients had an earlier image-

guided needle biopsy; in nine, the tissue obtained was nondiagnostic and in the one patient in whom the biopsy revealed lymphoma, the tissue was considered inadequate for subclassification. Eleven patients were considered poor candidates for image-guided biopsy as the enlarged lymph nodes were present in unsuitable locations (7) or small (4). In five patients presenting with chronic right lower abdominal pain and having normal imaging studies, mesenteric lymph nodes were identified at diagnostic laparoscopy. In one patient who was empirically started on antitubercular therapy upon identification of mesenteric nodal mass, a biopsy became necessary four months later when the response was found to be poor.

4. The diagnostic features of 11 cases hospitalized for abdominal tuberculosis in the Pediatric Surgery Department of Fattouma Bourguiba Hospital in Monastir for a 6-year period (2001-2006) were evaluated retrospectively. The diagnosis of abdominal tuberculosis was substantiated histopathologically by laparoscopy in all cases. The epidemiological and clinical characteristics along with the laboratory, radiological and histological data were studied.¹⁰

The diagnosis was suspected according to the epidemiological, clinical, biological and radiological findings. The final diagnosis was established by abdominal laparoscopy and a histological study. The epidemiological data included age, sex, BCG vaccination, raw milk intake, and family or personal history of tuberculosis or immunodeficiency. The general signs (fever, weight loss, night sweating, anorexia, abdominal pain and bowel movement disorder) and the clinical signs (abdominal swelling, abdominal mass, ascites and lymph nodes) were noted. The laboratory tests done were erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) (to screen for an inflammatory syndrome) with blood cell counts (to search for hyperleukocytosis). The bacteriological tests included a skin test (Mantoux test), *Mycobacterium tuberculosis* search in biological liquids (sputum, pleural effusion, ascites liquid), and polymerase chain reaction (PCR). A chest X-ray was taken for all patients to search for a pulmonary localization. In all cases, the abdominal imaging included an ultrasound examination to search for ascites and abnormal lymph nodes, explore palpable abdominal masses and rule out any surgical emergencies. A computerized tomography (CT) scan was performed in only five cases.

All operations were carried out under general endotracheal anesthesia with the patients placed in modified Lloyd-Davis, left lateral, right lateral or

trendelenburg positions to optimally expose the site of identified lymphadenopathy. A nasogastric tube and foley catheter were inserted, when appropriate both were removed at the end of surgery.

For upper abdominal procedures, a 10 mm camera port was placed slightly above the umbilicus and a 5 mm working port in each midclavicular line. In addition, a self-retaining retractor was set up to retract the left lobe of liver. The para-aortic nodes were biopsied by placing the camera port to the right of the midline at the level of umbilicus and two working ports in the midline on either side. For biopsy of the external iliac lymph nodes, the camera port was placed at the umbilicus along with two 5 mm port in pararectus positions. After carbon dioxide insufflation begun, a thorough exploration was performed. After identifying the lymph node, the peritoneum overlying the node was carefully incised using the hook cautery. The specimen was grasped and isolated circumferentially from surrounding tissues using blunt dissection, electrocautery or the harmonic scalpel. The base of the node was then clipped and the specimen removed. The abdomen was irrigated and hemostasis was verified.

RESULTS

The final diagnosis for the patients was as follows:

Diagnosis	No. of patients
Tuberculosis	33
Lymphoma	25
Reactive lymphadenitis	18
Metastatic adenocarcinoma	2
Castleman's disease	2
CLL	1
Seminoma	1
Retroperitoneal sarcoma	1
Recurrent carcinoma cervix	1
Peritoneal inclusion cyst	1
Lymphocele	1
Sarcoidosis	1

Seven patients (8%) required conversion to laparotomy. Two patients were converted due to difficulty in identifying the mass laparoscopically; one patient was converted because of the inability to obtain an adequate tissue sample after frozen analysis, one patient was opened for uncontrolled bleeding, one for appendicular, pseudotumor aspect of an intestinal loop in another case, and because of their pathological aspect appendicectomy and cecum biopsy in the seventh.

Additional studies were required in six cases (6.9%) to reach a final diagnosis.

There were no major operative and postoperative complications. The average duration of hospital stay was 2.5 days ranging from 1 to 6 days.

DISCUSSION

Although, ultrasonography and CT are useful in identifying abdominal lymphadenopathy, imaging findings may not always be disease specific. Nodes with low density centers, although characteristic of tuberculosis, are not pathognomonic and nodal calcification suggestive of tuberculosis can also be observed in metastases from testicular teratoma and non-Hodgkin's lymphoma.¹¹ Thus, the diagnosis of mesenteric or retroperitoneal masses requires adequate tissue for histological evaluation as well as the possible need for immunophenotyping, cytogenetic studies, and sometimes molecular genetics.

Image-guided biopsy is often the first line method for obtaining diagnostic tissue. In skilled hands ultrasonographically-guided FNAC¹² or CT-guided needle biopsy can yield tissue samples adequate for diagnosis.¹³ While not detailed in this review, a significant number of patients referred for surgical biopsy underwent successful CT-guided percutaneous biopsy, avoiding the need for surgery altogether. In a study of PFNA biopsies in 1,103 patients by Steel et al, 3.4% yielded false-negative results and 0.9% false-positive results.¹⁴ These studies confirm that when image-guided PFNA is able to provide sufficient tissue, histological analysis is of high diagnostic value. Radiographically guided biopsy, when feasible, is clearly the most appropriate first step in trying to determine the etiology of abdominal lymphadenopathy.

However, while numerous techniques have been defined to perform percutaneous biopsy, intervening structures and high-risk locations make some lesions unapproachable by percutaneous means.¹⁵ Surgical intervention becomes necessary when patients are poor candidates for image-guided needle biopsy or inadequate samples are obtained. Historically, laparotomy was the only means to obtain tissue diagnosis in such patients with mesenteric and retroperitoneal lymphadenopathy; however, laparoscopy is now proving to be a useful modality that avoids the need for a major open procedure in a large percentage of patients. Asoglu et al attempted laparoscopic biopsy in 94 patients and completed it successfully in 78.¹⁶ A laparotomy was required in 16 patients (17%) due to inadequate exposure, insufficient tissue, or postoperative adhesions. Lymphoma was diagnosed in 69 patients—in 55 (80%) via laparoscopy, in 9 (13%) via laparotomy, and in 5 (7%) with later procedures. Of the remaining 25 patients, 7 had non-

lymphomatous disease and 18 had benign lymphadenopathy. The false-negative rate for the laparoscopic procedures was 6%. One patient required conversion to laparotomy for intraoperative hemorrhage. This compares favorably with our review in which the conversion rate was 8%, and laparoscopic biopsy provided diagnosis in 81(93%) cases, while 6 required further work-up. Reported complications for laparoscopic biopsy are low. Mann et al reported no operative deaths with an 8% postoperative rate of complications.¹⁷ In our series, there were no postoperative complications.

In the developing world, lymphadenopathy is a common manifestation of abdominal tuberculosis. The incidence of tuberculosis infection has risen significantly in recent years due to several factors, such as poor socioeconomic status, misdiagnosis or improper treatment and the human immunodeficiency virus (HIV) pandemic.^{18,19} The abdominal form is seen in 25% of patients affected with pulmonary tuberculosis.²⁰ Starting patients diagnosed with AL on empirical antituberculous therapy is a practice fraught with the danger of missing out on or delaying the diagnosis of a more sinister pathology. Obtaining a substantial sample is mandatory in patients suspected to have lymph nodal tuberculosis resistant to the first line antitubercular drugs for bacteriological culture and antibiotic sensitivity. Pus in cold abscesses developing in relation to abdominal nodes is often thick and loculated, thus making it unsuitable for image-guided drainage. Traditional therapy involves laparotomy and drainage but laparoscopic drainage allows clearing up of all loculi as it also confers upon the patient all the benefits of a minimally invasive approach.²¹

Few studies have been published regarding laparoscopic biopsy for mesenteric and retroperitoneal adenopathy, and the majority is related to the diagnosis and staging of lymphoma.^{16,22,23} The ability to excise a complete lymph node without having to resort to laparotomy stands out as the single significant benefit of laparoscopic biopsy in the clinical setting of suspected lymphoma.

Lymph nodes, identified on imaging studies in patients being investigated for pyrexia of unknown origin (PUO), form yet another indication for laparoscopic lymph node biopsy. Arch Ferrer et al reported 15 patients with PUO who underwent diagnostic laparoscopy.²⁴ Tissue samples were obtained from liver, spleen and lymph nodes, which allowed an etiologic diagnosis to be reached in 10 patients and in ruled out abdominal pathology as cause for the PUO in four others. Thus, 93% of the patients undergoing laparoscopy were benefited by the procedure.

CONCLUSION

Laparoscopic retroperitoneal and mesenteric lymph node biopsy is a safe and effective, minimally invasive alternative to open biopsy. It is a useful technique for obtaining tissue for histological evaluation when image-guided PFNA biopsy is either unsuccessful, unable to be performed, and when previously unsuspected lymphadenopathy is identified during diagnostic laparoscopy. With its easy availability, early and judicious use of laparoscopic biopsy should be considered in the work-up of patients with abdominal lymphadenopathy.

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