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## Role of CECT abdomen in evaluation of abdominal lymph nodes in different abdominal pathologies: Does size of lymph nodes really matter?

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### Abstract

Many disease, neoplastic, infective, inflammatory, autoimmune result in abdominal lymphadenopathy. Because there is a complex pattern of intercommunications between regional groups of lymph nodes, it is usual for lymphadenopathy to involve several contiguous or even widely separated nodule chains. The abdominal lymph nodes are empirically divided into groups:

1. Retrocrural
2. Retroperitoneal
3. Porta hepatis
4. Gastrohepatic ligament
5. Celiac and superior mesenteric artery
6. Preaortic and paraaortic
7. Pancreaticoduodenal
8. Perisplenic
9. Periumbilical
10. Mesenteric

### Aims and Objectives

1. To evaluate lymph nodes in different abdominal pathologies i.e. group of lymphnodes involved, morphology, size etc.
2. To assess the size of lymph nodes in different abdominal pathologies.

**Keywords:** MDCT, Abdominal lymphnodes, abdominal pathologies

### Introduction

#### Retro-crural Nodes

The retro-crural space connects the posterior mediastinum to the retroperitoneum and contains the aorta, thoracic duct, azygos vein, hemiazygos vein and retrocrural lymph nodes. Lymphatics from the diaphragm, posterior mediastinum, and upper lumbar region drain directly to the retrocrural nodes, while the thoracic duct is the final lymphatic pathway from the entire pelvis, retroperitoneum, and peritoneal cavity.

Diseases originating above or below the diaphragm can communicate via the retrocrural space. Although lung carcinoma, mesothelioma, and lymphoma are the most common malignant diseases to involve this nodal group, other processes may cause retro-crural lymphadenopathy. Retrocrural nodes are considered to be enlarged when they exceed 6 mm in size.



**Fig 1:** Retro-crural Nodes

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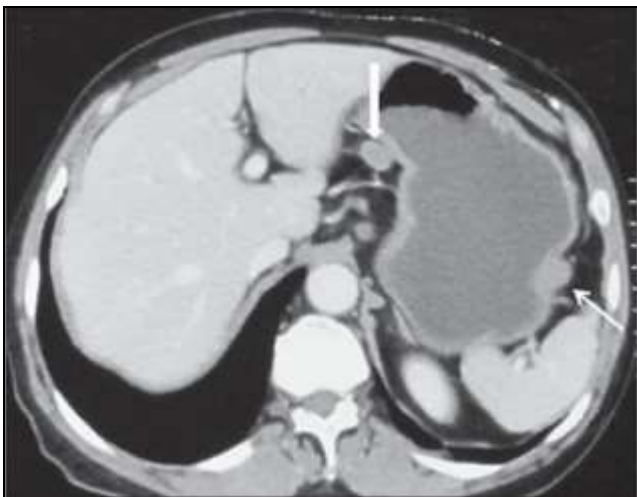
### Retroperitoneal Nodes

These nodes are present in a perivascular distribution about the aorta and inferior vena cava and are grouped into the periaortic, pericaval, and interaortocaval chains.

### Gastrohepatic ligament Nodes

The gastrohepatic ligament is the superior portion of the lesser omentum and contains the left gastric artery, coronary vein, and left gastric nodes. The gastro hepatic ligament suspends the stomach from the liver and blends into the fissure of the Ligamentum venosum; thus, it can be identified on CT sections containing this landmark. Drainage from the gastrohepatic ligament nodes is to the celiac nodal group.

Carcinoma of the lesser curvature of the stomach and distal esophagus often causes regional adenopathy in the gastrohepatic ligament nodal group. These nodes may also be enlarged by disseminated lymphoma, retro- grade spread from celiac nodes involved by carcinoma of the pancreas, and metastatic spread from a variety of distant primary malignant processes, including melanoma and carcinoma of the colon and breast. Gastro hepatic ligament nodes are considered to be enlarged when they exceed 8 mm in size. Potential diagnostic pitfalls include mistaking coronary varices or the upper margin of the pancreas and transverse colon for mild lymphadenopathy.

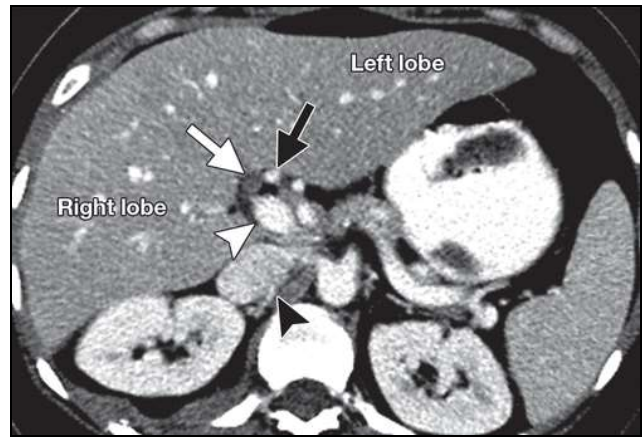


**Fig 2:** Gastrohepatic ligament Nodes

### Porta Hepatis Nodes

Portal nodes lie within the porta hepatis, extending down the hepatoduodenal ligament and interconnecting with the gastrohepatic ligament nodes. Central drainage is to the celiac nodes. The portal nodes lie anterior and posterior to the portal vein and, when enlarged, may completely surround and even obliterate this structure. Hence, adequate enhancement with intravenous contrast material is essential for diagnosis, particularly when only mild lymphadenopathy. Portal nodes are abnormal if greater than 6 mm in size.

Many primary neoplasms spread to the portal nodes, including those arising in the gallbladder and biliary tree, liver, stomach, pancreas, colon, lung, and breast. Because the portal nodes are in direct continuity with the intrahepatic lymphatic system, lymphadenopathy in this region is often associated with liver metastasis.



**Fig 3:** Porta Hepatis Nodes

### Celiac and Superior Mesenteric Artery Nodes

The celiac and superior mesenteric artery nodes, along with the nodes at the base of the inferior mesenteric artery, are termed preaortic nodes and have interconnections with the retroperitoneal periaortic nodes. Because the inferior mesenteric artery is not often visualized as a discrete structure on CT scans, nodes here are difficult to distinguish from retroperitoneal nodes. The celiac and superior mesenteric artery nodes are clustered around the origins of their respective vessels and are easily distinguished. These two groups are the terminal nodes of the gastrointestinal tract from the ligament of Treitz to the splenic flexure, receiving lymph from the mesenteric, iliocolic, and colic nodal chains. Portions of the pancreas also drain to this group of nodes. Interconnections to the portal and splenic nodal chains also exist; thus, virtually any intraabdominal neoplasm may cause adenopathy of the celiac and superior mesenteric artery nodes. These nodes are considered abnormal when they are greater than 10 mm in size. Enlargement of other more primary nodal sites may point toward the initial organ of involvement.

### Perisplenic Nodes

Perisplenic lymph nodes lie in the splenic hilum and drain the spleen, greater curvature of the stomach, and tail of the pancreas. Eventual drainage is to the celiac group via the pancreaticosplenic chain of nodes, which runs along the extent of the pancreas. Lymphoma and primary neoplasms of the pancreas, colon, stomach, lung, and breast commonly enlarge the perisplenic nodes. The upper limit of normal for these nodes is 10 mm.

### Pancreaticoduodenal Nodes

Pancreaticoduodenal nodes lie between the duodenal sweep and pancreatic head, anterior to the inferior vena cava. They are often grouped with the pericaval and superior mesenteric artery nodes into a category of peripancreatic nodes. When enlarged, they may cause distal extrahepatic biliary obstruction. Sonography may occasionally be helpful in making this differentiation. Pancreaticoduodenal nodes may communicate with nodes in the porta hepatis via lymphatics in the hepatoduodenal ligament, and thus lymphadenopathy of the pancreaticoduodenal nodes commonly coexists with hepatic parenchymal metastases. Lymphoma and carcinoma of the pancreatic head, colon, stomach, lung, and breast are

the most common malignant processes to involve these nodes. Nodes in this location exceeding 10 mm in size are considered enlarged.

**Mesenteric Nodes**

The small bowel mesentery contains a large number of nodes that accompany the branches of the superior mesenteric artery and vein. Multiple nodes are also present more distally, adjacent to the bowel wall. Eventual lymphatic drainage is to the superior mesenteric artery nodes at the base of the mesentery and from there to the retroperitoneal nodes. Non-Hodgkin lymphoma, leukemia, small bowel neoplasms, ovarian carcinoma, and carcinoma of the right and transverse colon are common causes of mesenteric lymphadenopathy.

In carcinoma of colon, Tumor extending beyond the colonic wall is involved with local mesenteric lymphnodes. (Duke's classification stage C).

In lymphoma, Early in the course, the lymph nodes may be small and discrete. As disease progresses, lymph nodes often coalesce to form conglomerated soft tissue mass, Enhancement- homogenous enhancement with peripheral enhancing walls.

**False-Positive Findings and Pitfalls in the Diagnosis of Lymphadenopathy**

There are several normal structures, anatomic variants, and other disease processes that may complicate evaluation of the abdominal lymph nodes. Problems relating to unopacified bowel and prominent normal vascular structures such as gonadal veins and iliac vessels can be avoided with use of proper oral and intravenous administration of contrast material. Vascular anomalies including left-sided or duplicated inferior vena cava and varices resulting from portal hypertension can be recognized by their enhancement pattern.

**Methodology**

**Inclusion Criteria**

Patients diagnosed as having abdominal pathology on MDCT imaging  
All patient who give consent for study.

**Exclusion Criteria**

Pregnant female  
Patients having elevated serum creatinine level (> 1.5 mg/dl).  
Patients not willing to take part in study.  
Peri-umbilical lymph nodes in normal patient is not considered.  
Bilateral inguinal regions are also excluded.

- **Study type:** prospective study in 50 cases

**Table 3:** Size of nodes present by location (abdominal quadrants)

Location	No. of patients	Mean size (mm) of largest node
Periumbilical	12	6
Right lumbar	8	4.5
Left lumbar	2	3
Right iliac fossa	22	5.8
Left iliac fossa	3	4

In the following study, most common location of lymphnodes is in right iliac fossa region. According to

- **Study Time:** JAN 2020 to JUNE 2020
- **Need of consent:** Informed written consent will be taken

**Analysis**

- Statistical analysis- Chi square test
- Software to be used - Microsoft Excel

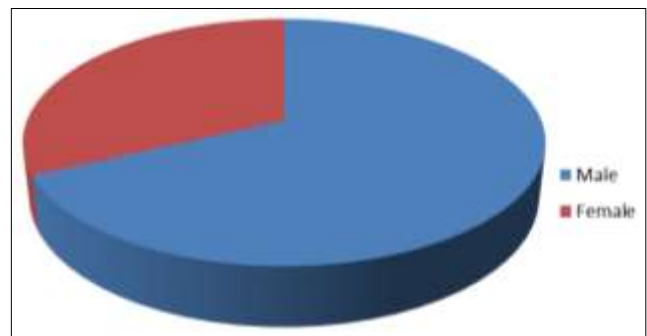
Lymph nodes evaluated were in that quadrant and adjacent to pathology.

CECT abdomen diagnosis was provided and correlated with symptoms and laboratory tests. e.g. Koch's test and histopathology findings from biopsy.

Gastrointestinal stromal tumor of small intestine was confirmed histopathologically.

**Table 1:** Gender wise distribution

Sex	Number of patient	Percentage
Male	34	68%
Female	16	32%
Total	50	100%



**Fig 4:** Gender wise distribution

Males are more commonly affected by abdominal lymphadenopathy in the following study.

**Table 2:** Age wise distribution

Age group years	Number of cases	Percentage
Below 10	3	6%
11-20	8	16%
21-30	11	22%
31-40	12	24%
41-50	4	8%
51-60	7	14%
61-70	5	10%
Total	50	100%

In the following study, most affected age group is 31-40 years, followed by 21-30 years.

study, 22 cases of right iliac fossa lymph nodes were reported with mean size of 6 mm.

**Table 4:** Pathologies according different quadrant.

Abdominal region	Pathology	Number (Few/multiple)	Lymph node Characteristic					
			Size(Mean size in mm)	Enhancement	Margins	Discrete/ Conglomerated	Necrosis (Present /Absent)	Calcificationa (present/absent) Type of calcification
Right hypochondrium	Liver abscess	3	8	Homogenous	Regular	Discrete	Absent	Absent
		4	7.5	Homogenous	Regular	Discrete	Absent	Absent
Epigastrium	Acute pancreatitis	4	7	Homogenous	Regular	Discrete	Absent	Absent
Left hypochondrium	Gastritis	5	6.5	Homogenous	Regular	Discrete	Absent	Absent
Right lumbar	Acute pyelonephritis	3	7.5	Homogenous	Regular	Discrete	Absent	Absent
Periumbilical	Lymphoma	8	20	Heterogenous enhancement with internal non enhancing necrotic areas	Lobulated	Confluent nodal mass	Present	Present-Amorphous calcification in center of lymphnode.
		5	10	homogenous	Regular	Discrete	Absent	Absent
Left lumbar	Psoas abscess	4	9	Homogenous	Regular	Discrete	Absent	Absent
		5	14	Heterogenous	Regular	Discrete	Present	Absent
Right iliac fossa	Ileocaecal koch's	9	22	Heterogenous enhancement with internal non enhancing necrotic area	Lobulated	Conglomerated	Present	Present- punctate calcification in center and peripheral wallls
		6	12	Homogenous	Regular	Discrete	Absent	Absent
Left iliac fossa	Carcinoma of colon	5	14	Homogenous	Regular	Discrete	Absent	Absent



**Image (a):** Shows large GIST of small bowel. The lesion was associated with sub centimeter homogeneously enhancing lymph nodes in preaortic and para aortic regions.

**Discussion**

In our study, total 50 patients were selected, The clinical history of each patient was recorded. CT scan was carried out with 16 slice Philips machine. Males are more commonly affected by abdominal lymphadenopathy in the following study. In the following study, most affected age group is 31-40 years, followed by 21-30 years. Out of 50 patients, most patients were diagnosed with lymphnodes in right iliac fosasa regions.

Six patients with liver abscess and two patients of acute cholecystitis, lymphnodes were found in right hypochondriac region, mostly in porta hepatis region. Lymph

nodes were few in numbers with sub centimeter in size and showing homogenous enhancement.

In epigastric region pathology, pancreatic lesion like acute pancreatitis were seen with few sub centimeter homogeneously enhancing lesion in peripancreatic and pancreaticoduodenal region.

Three patients with gastritis were included in study, sub centimeter homogeneously enhancing lymph nodes were seen in peri gastric region.

Patient with acute pyelonephritis of right kidney were having few sub centimeter homogeneously enhancing lymph nodes in right lumbar and right iliac fossa region.

Patient with abdominal lymphoma presented with enlarged and conglomerate lymph nodes with heterogenous enhancement and internal non enhancing necrotic areas in periumbilical and aorto-caval region. Amorphous central calcification was also seen in this patient. Two patients of GIST (gastro-intestinal stromal tumor) of small intestine were included in study, multiple homogeneously enhancing discrete lymph nodes were seen in peri umbilical and left lumbar region with an average size of 12 mm.

Patients with renal cell carcinoma of left kidney showed multiple enlarged discrete heterogeneously enhancing lymph nodes with internal non enhancing necrotic areas in para-caval and left lumbar regions, Maximum size of 14 mm. However, no evidence of any internal calcification was seen.

In right iliac fossa pathologies, 6 patients of Koch's abdomen were included in which most commonly ileocaecal junction was involved, multiple enlarged conglomerated heterogeneously enhancing lymph-nodes with internal non enhancing necrotic areas were seen in right lumbar and right iliac fossa region, largest lymph nodes measuring 22mm. There was evidence of central punctate and peripheral calcification in 2 cases.

2 patients having carcinoma of sigmoid colon were included in study, few enlarged discrete homogeneously enhancing lymph-nodes were seen in hypo-gastric and left lumbar regions, largest measuring 14 mm. However, no evidence of internal calcification or necrosis was seen.

Majority of conditions as per table were having homogeneously enhancing sub centimeter lymph nodes. However, patients with pathologies like abdominal lymphoma, ileocaecal koch's and renal cell carcinoma were having enlarged heterogeneously enhancing lymph nodes.

Multiplicity of lymph nodes were found in pathologies like lymphoma, Ileocolitis and ileocaecal koch's.

Even if these lymph nodes are thought to result from an infectious or inflammatory process, obtaining a follow-up MDCT scan is sometimes suggested to ensure full resolution.

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