Imaging aspects of lymphoproliferative disease following liver transplantation

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Purpose

Our study aim is to present, illustrate and discuss the wide variety of imaging findings of posttransplantation lymphoproliferative disorder (PTLD) following liver transplantation because it can involve nearly any organ or system.

Knowledge of the various appearances of PTLD is important because is an increasing problem especially in children, and prompt and appropriate treatment affects outcome.

Background

PTLD is a condition in patients who receive transplants, both children and adults, first reported by Penn et al. in 1969 [1], in which chronic immunosuppression leads to an unregulated expansion of lymphoid cells. The condition ranges from hyperplasia to malignant lymphoid proliferation with nodal and extranodal site involvement. Many of these lesions are related to infection from Epstein-Barr virus (EBV), but the presence of this virus is not essential for the diagnosis [8]. The majority of cases are characterized by B-cell proliferation. Neoplastic PTLD should have 2/3 of: 1/ disruption of tissue architecture, 2/ oligo- or monoclonal populations, 3/ EBV infection of many cells [6].

Gray-scale ultrasonography (US) and color-Doppler (CDUS) are the initial imaging modality of choice because have high sensitivity and specificity in detection and follow-up of early and delayed complications of liver transplantation and prevents misdiagnoses [7]. US the preferred postoperative screening method because it is cost-effective, accessible, noninvasive, and easily performed at bedside and it doesn’t expose population to radiation. US/CDUS must be performed daily during the first week, once a week in the following two months and once a month after that. The use of a contrast agent at US may help improve the sensitivity of detection of PTLD, but US contrast agents are not readily available for use in standard clinical practice in our country. When US findings are inconclusive, imaging with other modalities is necessary.

Multidetector-row computer tomography (MDCT) is considered the best option to confirm the US suspicion of early and late complication after liver transplantation. It lets a good evaluation of liver parenchyma and other abdominal organs, bleeding, abdominal or hepatic abscesses, intestinal involvement. Contrast-material enhanced CT is the most widely used modality due to its ready availability and ease of use [2].

Positron emission tomography (PET-CT) with the glucose metabolism radiotracer 2-[fluorine-18]fluoro-2-deoxy-d-glucose (FDG) is a new diagnostic technique that has become a widely used and preferred imaging modality for many cancers, including lymphoma. It has proved to be helpful in evaluating response to therapy, especially in patients with persistent lesions in whom FDG uptake can help differentiate between residual tumor and fibrosis or necrosis. Inflammatory and infectious lesions can
accumulate FDG and lead to false-positive findings at PET/CT, a pitfall that can largely be avoided by taking into account the CT morphologic features of the site, the patient’s clinical symptoms, and laboratory findings [9].
Methods and Materials

A data base of adult and children liver transplants from 1997 to 2011 was performed and patients with PTLD identified. Patients notes, radiological images and pathological reports were retrospectively examined.

Three patients with orthotopic liver transplantation were identified as having PTLD, aged 1 to 57 at the time of transplant, with a ratio of female-to-male of 1:2.

- US and CDUS evaluation of the post transplantation liver was the first imaging modality to detect PTLD, followed by MDCT and PET-CT

- MDCT equipment and technique used: 16 MDCT; images were acquired in the cranio-caudal direction; collimation: 0,75 mm; feed/rotation: 11,3 mm; slice width: 5,0 mm; nonionic iodinated contrast medium intravenous with 350-400 mg iodine/ml at a dose of 1,0-1,5 ml/kg and at a rate that depends on the age of the patient; usually we have done: arterial phase and portal venous phase; for post-processing of the dataset we have used multiplanar reconstruction (MPR) and maximum intensity projection (MIP).

- In our study we have use PET-CT to monitoring post-tratament evolution of the patients.
Results

- Indications for liver transplantation was biliary atresia (one patient who is a child) and cirrhosis caused by hepatitis B in the other two cases.

- The time from liver transplantation to diagnosis ranged from 10 months to 8 years.

- All of the patients from our study were found to have more than one organ affected, most often the liver and gastrointestinal tract are the involved entities.

- In all cases biopsy confirmed B cell lymphoma.

Imaging findings:

- **Small bowel** involvement was detected in one of our cases on US with dilatation and circumferential wall thickening in the mesogastrum (Fig.1.a,b). Enhanced CT was performed and this confirmed the thickened wall of the distal segment of the ileum (Fig.2.a) and a well circumscribed mesenteric mass including calcification and necrosis (Fig.2.b,c). The result of biopsy of the mesenteric mass confirmed B-cell lymphoma.

- The pattern of **hepatic** PTLD identified in our case was represented by multifocal small hypodense-hypovascular nodular hepatic lesions (Fig.5.a,b), seen at an male patient 3 years after liver transplantation.

- **Splenic** PTLD manifested in our study group as enlargement associating focal hypodense-hypovascular lesion (Fig.5.c,d) or with homogeneous enlargement (Fig.1.c).

- **Kidney** involvement was represented by unilateral discrete round, hypovascular parenchymal lesions (Fig.7.a,b,c).

In our patients group **abdominal lymph node** involvement was frequently observed in retroperitoneal space (Fig.6.c,d,e,f) rather than those in peritoneal space (Fig.6.a,b). Homogeneous enlarged lymph node were noted.

- **Thoracic** involvement in PTLD included mediastinal lymph node enlargement (Fig.4.a,b,c,d) in association with non-specific small pleural effusion (Fig.4.d) in a patient who one year later at thoracic CT is detected with multiple parenchymal homogeneous nodules randomly distributed and "ground-glass" opacities with no predilection for any one location (Fig.4.e,f).

- PTLD of the **neck region** was detected at an routine follow-up physical examination with palpable inferior cervical lymph node enlargement. Axial CT scan confirms bilateral
supraclavicular node enlargement (Fig.3.a,b) and percutaneous biopsy confirmed B-cell lymphoma.

**Discussions:**

- The incidence of PTLD after liver transplantation is reported between 2-8.4% [2, 8]; in our study group the incidence of 0.7% is lower than the published rates. The time between transplantation and the onset of PTLD is often used to distinguish between two sets of patients with possibly distinct presentations and pathogenesis: early-onset PTLD (within the first year after transplantation) and late-onset PTLD (more than 1 year after transplantation). In our cases, all the patients have late-onset PTLD, with the mean time 47 months, which is much longer than the reported intervals of 7-14 months [2]. The majority of PTLD are B-lymphocyte proliferations and are related to EBV infection. All cases from our study were confirmed at biopsy with B-cell lymphoma.

- The reported imaging of PTLD following liver transplantation have included intraabdominal, thoracic, head and neck and musculoskeletal manifestations [2,4,5]. Like in reported studies [5], all of the patients were found to have more than one organ affected and the abdominal cavity is the compartment involved in all cases.
Images for this section:

**Fig. 1:** 9 years old boy presenting with abdominal pain and sub-occlusive syndrome 8 years after liver transplantation. US shows dilatation and markedly thickened small bowel wall (a, b) and splenomegaly (c).

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Fig. 2: 9 years old boy presenting with abdominal pain and sub-occlusive syndrome 8 years after liver transplantation. Axial enhanced-CT scan confirms the circumferential wall thickening (a, double arrow), and a large well circumscribed mesenteric nodal mass including calcifications and necrosis (b, c, *). Note lymph node enlargement (c, arrow). The results of biopsy of the mesenteric nodal mass confirmed B-cell lymphoma. Axial post treatment PET-CT image reveals significant improvement of the lesion (d).

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Fig. 3: 60 years old male patient 3 years after liver transplantation at an routine follow-up is detect on physical examination with supraclavicular lymph node enlargement. Axial enhanced-CT scan confirms bilateral supraclavicular lymph node enlargement (a,b, arrows). The results of percutaneous biopsy of an enlarged lymph node confirm B-cell lymphoma.

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**Fig. 4:** 60 years old male patient 3 years after liver transplantation. Axial enhanced CT: hepatic PTLD with multifocal discrete hypodense-hypovascular nodular lesions (a, b, red arrows) and splenic involvement: splenomegaly (c, d) with hypodense-hypovascular, pseudonodular lesion with subcapsular topography (c, d, white arrow). Dilatation of spleno-portal system and perisplenic venous collaterals.

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**Fig. 5:** 60 years old male patient 3 years after liver transplantation. Thoracic axial enhanced-CT images shows discrete enlargement of lower para-tracheal (a, b, c, red arrows), sub-aortic (a, white arrows) and subcarinal lymph nodes (d, yellow arrow); non-specific pleural effusion (d, *). One year later, coronal (e) and axial (f) MIP images shows patchy nodules randomly distributed throughout the lung and "ground-glass" opacities.

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Fig. 6: 60 years old male patient 3 years after liver transplantation. Axial enhanced CT shows enlargement of lymph nodes in perigastric (a, arrow), celiac territory (b, arrow) and retroperitoneal space (c, d, e, f, arrows).

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Fig. 7: 60 years old male patient 3 years after liver transplantation. Axial enhanced CT, excretory phase shows unilateral left kidney round-ovalar, hypovascular parenchymal lesions (a, b, c, red arrows) and small cystic lesion (c, white arrow).

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Conclusion

The role of imaging in patients with PTLD is to detect disease, guide biopsy, and direct appropriate follow-up imaging rather than to establish a specific diagnosis.

The radiologist plays a pivotal role in the early diagnosis of the lesions, in guiding biopsy, and in the surveillance of treatment response in patients with PTLD.

Because the clinical and imaging manifestations of PTLD are nonspecific and are not reliably predictable of histopathologic subtype, tissue biopsy is necessary for final diagnosis.
References

3. Salvatore Gruttadauria, MD, Associate Professor, Series Editor Pediatric liver transplantation World J Gastroenterol 2009 February 14; 15(6): 648-674
7. Jane D. Crossin, Derek Muradali, Stephanie R. Wilson: US of Liver Transplants: Normal and Abnormal; Radiographics 2003; 23:1093-1114
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