

Title: PEDIATRIC TRANSPLANTATION PATHOLOGY

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Synopsis: Transplantation of many organs has become standard of care in specialized centers throughout the world. As these patients are being followed in many different institutions and settings, pathologists with varying interests are being asked to diagnose surveillance biopsies and complications of transplantation. The pathogenesis of acute and chronic rejection and other long term complications continues to be better studied and understood leading to newer and more effective therapies, but with different side effects. Many of the classification schemes for grading or rejection have been recently re-evaluated and modified. Thus, there is a need for an update in pediatric transplantation pathology.

In the first half of this workshop, we will discuss pathology of heart and lung transplantation including indications, complications (infection, acute and chronic rejection, and humoral rejection) and outcomes. Salient features of graft-versus-host disease will also be briefly discussed. The second half will cover the principles of classifying acute cellular rejection in pediatric liver and small bowel recipients. The approach to diagnosis of various immediate post-transplant complications such as acute humoral rejection, perfusion/reperfusion injury, vascular compromise and biliary strictures as well as recognition of changes of chronic rejection will be covered. A separate subsection will cover the common pediatric post-transplant lymphoproliferative disorders such as polymorphic and monomorphic PTLD as well as Burkitt's lymphoma. Uncommon PTLD such as Hodgkin's-like PTLD and post-transplant Hodgkin's lymphoma will be briefly touched upon. Post-transplant smooth muscle tumors will also be covered.

Needs Assessments:

1. As more and more solid organ transplants are being done, and survival has improved, there are more long-term survivors with a different set of complications, the most important of which is chronic rejection. There is a greater need to recognize and treat risk factors that are now being better understood.
2. New formulation for heart rejection was published by the ISHLT (International Society for Heart and Lung Transplantation) in 2004 that has led to even more discussion and controversy. This needs to be understood in the context of the 1990 formulation, and clinical implications.

3. New formulation for lung rejection has been proposed by a working group from the ISHLT that is also controversial. This, too, needs to be compared to the 1996 formulation and put in context with the clinical issues of treating acute rejection.
4. The complications of liver transplant are myriad and differ in many aspects from that seen in adults. The nuances of acute cellular rejection especially when pertaining to central venulitis and complications of vascular compromise need to be recognized.
5. More and more centers are now performing small bowel transplants including multivisceral transplants. Hence an increased awareness of the grading system as well as recognition of changes of chronic rejection and infectious and neoplastic complications is required.

Overall Workshop Objectives

After attending the workshop, the participant will be able to:

1. List common indications for heart, lung, liver, and small bowel transplantation in children and contrast them with adults.
2. Diagnose complications of organ transplantation including surgical, infectious, and rejection-associated complications.
3. Analyze the outcomes of transplantation, and cite the reasons leading to improved quality of life and survival of transplant recipients.

Workshop Objectives for Heart and Lung – Dr. Husain

After attending the workshop, the participants will be able to:

1. Evaluate post-lung transplant biopsies for
 - a. Infection
 - b. Rejection
 - c. Aspiration
 - d. Post-transplant lymphoproliferative disorder
2. Diagnose acute rejection, Quilty lesion and myocarditis in heart biopsies.
3. Use the new rejection grading systems in heart and lung and contrast them with the older working formulations.
4. Compare and contrast the use of C4d by immunohistochemistry and immunofluorescence in the diagnosis of humoral (antibody-mediated) rejection.

Workshop Objectives for Liver and Small Bowel – Dr. Ranganathan

At the end of this education session the participants will be able to:

1. Diagnose acute cellular rejection in the liver and small bowel transplant recipients.
2. Diagnose acute humoral rejection and other immediate post-transplant complications.
3. Diagnose chronic rejection.
4. Formulate the approach to common and uncommon pediatric post-transplant lymphoproliferative disorders and post-transplant smooth muscle tumors.

References for Dr. Husain

Workshop

Transplant Pathology Workshop with R Jaffe, M.D. and M. Parizhskaya, M.D., Society of Pediatric Pathology Annual Meeting with United States and Canadian Academy of Pathology (2000 - 2002).

Book Chapters

Husain AN, Gaweco AS. Pathology of Pulmonary Allograft Dysfunction. In: Norman DJ, Turka LA, eds. Primer on Transplantation. 2nd Edition. Mt. Laurel, NJ: American Society of Transplantation, 2001; 696-704.

Husain AN. Transplant Related Lung Pathology. In: Zander D, Farver, eds. Pulmonary Pathology, in press.

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 13. Husain AN, Gaweco AS. Lung transplantation. Editorial overview. *Curr Opin Org Transpl* 2000; 5: 383.
 14. Villanueva J, Bhorade SM, Robinson JA, Husain AN, Garrity ER. Extracorporeal photopheresis for the treatment of lung allograft rejection. *Ann Transplant* 2000; 5:44-47.
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References for Dr. Ranganathan

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2. Ozolek JA, Cieply K, Walpusk J, Ranganathan S. Adenovirus infection within stromal cells in a pediatric small bowel allograft. *Pediatr Dev Pathol* 2006; 9(4):321-327.

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4. Ranganathan S, Teot LA, Hunt J, Sindhi R, Jaffe R. Posttransplant spindle cell tumors: An immunohistochemical and molecular study. *Mod Pathol* 2006; 19:2, 329.

Workshop Schedule:

1.	Heart and lung transplant pathology	Dr. Husain	45 min
2.	Questions and answers	Dr. Husain	5 min
BREAK			
3.	Liver, small bowel and pancreas transplant pathology	Dr. Ranganathan	50 min
4.	Questions and answers	Dr. Ranganathan	10 min