Trapianto di fegato nel trattamento dei tumori epatici nel bambino

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Unità di Chirurgia Epatobiliare e Centro Trapianto Epatico

Padova, 21 settembre 2011
First liver transplant in the world
Thomas E. Starzl, 1963
Denver, University of Colorado

Biliary Atresia, male, 3 y.o.
Multiple previous surgeries
Died for bleeding

First successful liver transplant
Thomas E. Starzl, 1967
Denver, University of Colorado

Tumor, 18 months old
Survival 400 days, COD: tumor recurrence
ELTR’s Data
Primary Indication of Liver Transplantation in Pediatric Patients

05/1968 - 12/2009

- Metabolic diseases: 271 (9%)
- Acute hepatic failure: 251 (8%)
- Cirrhosis: 142 (5%)
- Cancers: 90 (3%)

0 to 2 Years (3073 children)
- Cholestatic diseases: 2240 (75%)
- Metabolic diseases: 1021 (26%)
- Cancers: 226 (6%)

2 to 15 Years (4111 children)
- Cholestatic diseases: 1678 (43%)
- Acute hepatic failure: 579 (15%)
- Cirrhosis: 411 (10%)

ELTR’s Data
ELTR’s Data

Survival according to Children Recipient Age
01/1988 - 12/2009

Patient

Graft

\[\text{Log Rank} = \text{NS}\]

\[< 2 \text{ yrs} : 3132\]
\[2 - 15 \text{ yrs} : 4206\]

\[< 2 \text{ years} : 3481\]
\[2 - 15 \text{ years} : 4974\]
Survival of Children >= 2 yrs according to the Main Indication in Europe
01/1988 - 12/2009

ELTR’s Data
ELTR’s Data

Patient Survival according to Recipient Age
01/1988 - 12/2009

Children : 7338
Adults : 73762
Il Trapianto di Fegato

up to date in liver transplantation

Partial livers
Vena porta
Vene sovraepatiche
Via biliare
Vena cava
Lig. rotondo

Sg2 e Sg3: Segmento laterale sinistro
Sg2 + Sg3 + Sg4: Emifegato sinistro
Sg 5-6-7-8: Emifegato destro
ITALY - Pediatric waiting list

Programma Nazionale Pediatrico - Fegato - Dimensione della Lista dal 97 al 2002

<table>
<thead>
<tr>
<th>Data di aggiornamento</th>
<th>Numero pazienti</th>
</tr>
</thead>
<tbody>
<tr>
<td>21/02/97</td>
<td>0</td>
</tr>
<tr>
<td>01/06/97</td>
<td>0</td>
</tr>
<tr>
<td>09/09/97</td>
<td>0</td>
</tr>
<tr>
<td>18/12/97</td>
<td>0</td>
</tr>
<tr>
<td>28/03/98</td>
<td>5</td>
</tr>
<tr>
<td>06/07/98</td>
<td>0</td>
</tr>
<tr>
<td>14/10/98</td>
<td>0</td>
</tr>
<tr>
<td>22/01/99</td>
<td>0</td>
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<tr>
<td>02/05/99</td>
<td>15</td>
</tr>
<tr>
<td>10/08/99</td>
<td>0</td>
</tr>
<tr>
<td>18/11/99</td>
<td>0</td>
</tr>
<tr>
<td>26/02/00</td>
<td>0</td>
</tr>
<tr>
<td>05/06/00</td>
<td>0</td>
</tr>
<tr>
<td>13/09/00</td>
<td>0</td>
</tr>
<tr>
<td>22/12/00</td>
<td>0</td>
</tr>
<tr>
<td>01/04/01</td>
<td>0</td>
</tr>
<tr>
<td>10/07/01</td>
<td>0</td>
</tr>
<tr>
<td>18/10/01</td>
<td>0</td>
</tr>
<tr>
<td>26/01/02</td>
<td>0</td>
</tr>
<tr>
<td>06/05/02</td>
<td>0</td>
</tr>
</tbody>
</table>

**Before Split**
- MEDIAN W.T. (days): 259 (range 1-919)

**After Split**
- MEDIAN W.T. (days): 72 (range 12-243)
Strategies to reduce pediatric waiting-list mortality

• REDUCED-SIZE LIVER TRANSPLANTATION
  ✓ Does not increase the organ pool
  ✓ Today only for selected cases (trauma)

• SPLIT LIVER TRANSPLANTATION
  ✓ Ex Situ: long ischemic times, vascular and biliary complications.
  ✓ In Situ: Technically demanding, organizative problems, problem for other explant organs

• LIVING DONOR LIVER TRANSPLANTATION
  ✓ Risk for the donor
Pediatric liver transplantation
Technical options

• Whole liver graft
  20-30%

• Segmental liver graft  70-80%
  • Reduced size
  • Split liver
  • Living
  • Auxiliary
Whole liver graft
Segmental liver graft
Reduced size

- Back table resection of a cadaveric donor graft
- Long cold ischemia time
- Half liver discharged
- Rationale only in traumatized livers
Segmental liver grafts “in-situ” Split liver

1 Cadaveric liver for 2 Recipients (1 adult + 1 child)
Segmental liver grafts
Split liver
Trapianti di Fegato

Inclusi i trapianti combinati

*Dati definitivi al 31 dicembre 2010

FONTE DATI: Dati Reports CIR
CENTRO TRAPIANTO DI FEGATO-PADOVA

Attività trapianto di fegato 1991-2011

*Al 19/09/11
CENTRO TRAPIANTI DI FEGATO PADOVA
PARTIAL GRAFTS = 131 (13%)
CENTRO TRAPIANTI DI FEGATO PADOVA:

PARTIAL GRAFTS = 124 (13%)

Anno 2010 = 21% dei trapianti utilizzando un fegato parziale
CENTRO TRAPIANTI DI FEGATO PADOVA
Sopravvivenza nel trapianto con fegato parziale

PATIENT SURVIVAL (112 patients)

<table>
<thead>
<tr>
<th></th>
<th>1yr</th>
<th>5yr</th>
<th>10yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intero</td>
<td>83%</td>
<td>76%</td>
<td>75%</td>
</tr>
<tr>
<td>Parziale</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GRAFT SURVIVAL (124 OLT)

<table>
<thead>
<tr>
<th></th>
<th>1yr</th>
<th>5yr</th>
<th>10yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intero</td>
<td>74%</td>
<td>69%</td>
<td>67%</td>
</tr>
<tr>
<td>Parziale</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P=0.73

P=0.23
102 Trapianti pediatrici / 1008 totali (10%)

*al 19/09/2011
TRAPIANTO DI FEGATO - PADOVA
102 Trapianti pediatrici / 1008 totali

Eziologia

- Colestatiche: 35
- Altro: 9
- Epatoblastoma: 12
- FHF: 13
- Re-OLTx

ALTRO:
- Iperossaluria: 6
- Emocromatosi, Def. α1 AT: 6
- Sdr. Crigler Najjar: 3
- altro: 20
TRAPIANTO DI FEGATO - PADOVA

102 Trapianti pediatrici / 1008 totali

Tipi di organo utilizzati

- Intero: 40
- Split sx: 48
- Split dx: 6
- Splittone: 1
- Ridotto: 1
- LDLT: 1
PATIENT SURVIVAL (89 patients)

1yr 5yr 10yr
86% 86% 84%

Overall mortality = 15%

GRAFT SURVIVAL (98 OLT)

1yr 5yr 10yr
76% 76% 74%

P=0.04

P=0.42
Pediatric Liver Tumors

• **MALIGNANT LIVER TUMORS**
  
  o  Hepatoblastoma (HB)
  o  Hepatocellular Carcinoma (HCC)
  o  Hepatic Hepithelioid Hemangioendothelioma (HEHE)
  o  Undifferentiated, embryonal and rhabdoid Sarcomas, and Angiosarcoma

• **BENIGN LIVER TUMORS**
  
  o  Hepatic Ademoma/Adenomathosis (HA)
  o  Hepatic Hemangiomia
Pediatric malignancies

Hepatoblastoma (HB)
Hepatocellular Carcinoma (HCC)

most common malignant liver tumors

0.5–1.5% of all childhood malignancies - Incidence: 0.5–1.5/1,000,000/year

Long-term survival of patients with advanced HCC is 10–20%, while that of patients with advanced HB ranges from 30% to 60%

Women represented 43.5% of transplants for HB, 48.3% for HCC, 74.3% for HEHE, and 61.1% for other liver tumors.

The mean ages at transplantation for HB, HCC, HEHE, and other liver tumors were 2.9, 10.5, 1.3, and 7.9 yr, respectively
PRETEXT system is principally used for Hepatoblastoma (HB)

The 2005 revision is intended to be applicable to all primary malignant liver tumours of childhood, including: Hepatocellular carcinoma (HCC) and Epithelioid haemangioendothelioma (HEHE)

- Defines the extent of the tumor within the liver
- Used as a risk stratification system by SIOPEL
- Tool to define surgical resectability by both SIOPEL and COG.

PRETEXT can be used to identify, at diagnosis, which tumors might most benefit from a liver transplant as a surgical resection strategy.
**Table 2 2005 PRETEXT staging: additional criteria**

<table>
<thead>
<tr>
<th>Caudate lobe involvement</th>
<th>C0</th>
<th>All other patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Tumour involving the caudate lobe</td>
<td></td>
</tr>
<tr>
<td>Extrahepatic abdominal disease</td>
<td>E0</td>
<td>No evidence of tumour spread in the abdomen (except M or N)</td>
</tr>
<tr>
<td>E1</td>
<td>Direct extension of tumour into adjacent organs or diaphragm</td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>Peritoneal nodules</td>
<td></td>
</tr>
<tr>
<td>Tumour focality</td>
<td>F0</td>
<td>Patient with solitary tumour</td>
</tr>
<tr>
<td>F1</td>
<td>Patient with two or more discrete tumours</td>
<td></td>
</tr>
<tr>
<td>Tumour rupture or intraperitoneal haemorrhage</td>
<td>H0</td>
<td>All other patients</td>
</tr>
<tr>
<td>H1</td>
<td>Imaging and clinical findings of intraperitoneal haemorrhage</td>
<td></td>
</tr>
<tr>
<td>Distant metastases</td>
<td>M0</td>
<td>No metastases</td>
</tr>
<tr>
<td>M1</td>
<td>Any metastasis (except E and N)</td>
<td></td>
</tr>
<tr>
<td>Lymph node metastases</td>
<td>N0</td>
<td>No nodal metastases</td>
</tr>
<tr>
<td>N1</td>
<td>Abdominal lymph node metastases only</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Extra-abdominal lymph node metastases (with or without abdominal lymph node metastases)</td>
<td></td>
</tr>
<tr>
<td>Portal vein involvement</td>
<td>P0</td>
<td>No involvement of the portal vein or its left or right branches</td>
</tr>
<tr>
<td>P1</td>
<td>Involvement of either the left or the right branch of the portal vein</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>Involvement of the main portal vein</td>
<td></td>
</tr>
<tr>
<td>Involvement of the IVC and/or hepatic veins</td>
<td>V0</td>
<td>No involvement of the hepatic veins or inferior vena cava (IVC)</td>
</tr>
<tr>
<td>V1</td>
<td>Involvement of one hepatic vein but not the IVC</td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>Involvement of two hepatic veins but not the IVC</td>
<td></td>
</tr>
<tr>
<td>V3</td>
<td>Involvement of all three hepatic veins and/or the IVC</td>
<td></td>
</tr>
</tbody>
</table>

All C1 patients are at least PRETEXT II
Add suffix “a” if ascites is present, e.g., E0a
Add suffix or suffixes to indicate location (see text)
See text for definition of involvement. Add suffix “a” if intravascular tumour is present, e.g., P1a
See text for definition of involvement. Add suffix “a” if intravascular tumour is present, e.g., V3a
INDICATION FOR LT:

1. PRETEXT IV
2. Multifocal PRETEXT III
3. Central tumors involving the IVC or all 3 hepatic veins or the main portal vein or both its right left and right branches

Involvement of the major liver vessels does not contraindicate transplantation if all tumors can be excised at the time of hepatectomy

Lung metastases that clear with adjuvant CT or surgical resection by the time of transplantation
Hepatoblastoma (HB)
Primary resections whenever the imaging studies indicate the potential for complete excision without endangering the patient.

Stage I - R0 resection, pure fetal hystology: No Chemotherapy

Stage II and R0 resection non pure fetal hystology → 4 cycles of C5V (Cis-Pt, 5-FU, VinCr)

Stage III – IV: Neoadjuvant CT
  • Classic Scheme: 4 cycles of C5V → Resection/OLTx → 2 cycles C5V
  • Current Raccomandation: 2 cycles of C5V → Revalutation → Eventual add of Doxo
  • Eventual add of Doxo from the 1st cycle in Stage IV
### Risk Stratification in Hepatoblastoma for Current SIOPEL Studies

<table>
<thead>
<tr>
<th>High Risk</th>
<th>Standard Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with any of the following:</td>
<td>Serum alpha-fetoprotein &lt;100 µg/l</td>
</tr>
<tr>
<td></td>
<td>PRETEXT IV</td>
</tr>
<tr>
<td></td>
<td>Additional PRETEXT criteria:</td>
</tr>
<tr>
<td></td>
<td>E1, E1a, E2, E2a</td>
</tr>
<tr>
<td></td>
<td>H1</td>
</tr>
<tr>
<td></td>
<td>M1 (any site)</td>
</tr>
<tr>
<td></td>
<td>N1, N2</td>
</tr>
<tr>
<td></td>
<td>P2, P2a</td>
</tr>
<tr>
<td></td>
<td>V3, V3a</td>
</tr>
</tbody>
</table>
The SIOPEL treatment protocols are based on the PRETEXT classification system.

SIOPEL recommendations: all patients get at least 2 courses of chemotherapy prior to surgery.

- Standard Risk Tumor: Cisplatin alone or in combination with Doxorubicin.
- High Risk Tumor: Cisplatin, Doxorubicin and Carboplatin.

Revaluation after 2 cycles → Surgical Planning

RESECTION OR TRANSPLANTATION AFTER CYCLE 4 IF POSSIBLE

→ POST-OPERATIVE CT DEPENDING ON THE NUMBER OF CYCLE BEFORE SURGERY.
Hepatoblastoma (HB)

Kaplan–Meier survival estimate from diagnosis-HB

PLUTO Registry

Finegold - Liver Transplantation 14:1545-1556, 2008
Fig. 1. Kaplan–Meier curve of patient survival. Transplants for non-tumors have statistically significant improvement compared to other liver tumors (p-value of 0.0009) and HB when compared to HCC (p-value of 0.00514).

Fig. 2. Kaplan–Meier curve of allograft survival. HEH have worse survivals than patients with non-tumor and HB (p-values of 0.0016 and 0.0349). Non-tumor Tx have improved outcomes when compared to HCC (p-value of 0.0016).
# Hepatoblastoma (MB)

<table>
<thead>
<tr>
<th>Author/Institution</th>
<th>Year</th>
<th>Patients</th>
<th>5 yr survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reyes et al.</td>
<td>1998</td>
<td>12</td>
<td>83</td>
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<tr>
<td>Pimpalwar et al.</td>
<td>2001</td>
<td>16</td>
<td>79</td>
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<tr>
<td>Srinivasan et al.</td>
<td>2001</td>
<td>10</td>
<td>100</td>
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<tr>
<td>Molmenti et al.</td>
<td>2001</td>
<td>11</td>
<td>66</td>
</tr>
<tr>
<td>Siopel – 1</td>
<td>2001</td>
<td>12</td>
<td>66</td>
</tr>
<tr>
<td>UNOS Report</td>
<td>2004</td>
<td>135</td>
<td>66</td>
</tr>
<tr>
<td>ELTR Report</td>
<td>2007</td>
<td>129</td>
<td>74</td>
</tr>
<tr>
<td>Padova</td>
<td>2011</td>
<td>10</td>
<td>90</td>
</tr>
</tbody>
</table>

**Prognostic Factors**
- Answer to CT
- Not radically resected cancer has worse outcome than not resectable one
CENTRO TRAPIANTI DI FEGATO PADOVA
Sopravvivenza nel trapianto pediatrico

PATIENT SURVIVAL (89 pazienti)

P=NS

Epatoblastoma (10)
Altro (79)
Pediatric malignancies

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>HB</th>
<th>HCC</th>
<th>HEHE</th>
<th>Other tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence</td>
<td>26</td>
<td>14</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cardiac</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Infection/sepsis</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Allograft failure</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MOF</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

- **HB**: death for recurrence in 53% of cases
- **HCC**: deaths for recurrence in 64% of cases
- **HEHE**: deaths for recurrence in 9% of cases
- **Other tumor** deaths had recurrence 14% of the time
MANAGEMENT OF HB RECURRENCE:

“SALVAGE CT”

- Doxorubicin (if not yet exposed)
- Irinotecan
- Ifosfamide

Direct arterial Chemotherapy and/or Chemoembolization
Pediatric Liver Tumors

• **MALIGNANT LIVER TUMORS**
  - Hepatoblastoma (HB)
  - Hepatocellular Carcinoma (HCC)
  - Hepatic Hepthelioid Hemangioendothelioma (HEHE)
  - Undifferentiated, embryonal and Rhabdoid Sarcomas, and Angiosarcoma

• **BENIGN LIVER TUMORS**
  - Hepatic Ademoma/Adenomathosis (HA)
  - Hepatic Hemangioma
Pediatric HCC

Risk factors:
- Tyrosinemia
- Chronic cholestatic conditions
- Wilson’s Disease
- Hepatitis B
- Glycogen-storage Disorders

Incidence of 0.5/1,000,000 year
Males (59%) with a median age of 10 years

Mean ages at transplantation for HCC: 10.5 yr.
Pediatric HCC - OLTx

Role for Milan Criteria in Pediatric Liver Transplantation?

Too restrictive for children at low risk of recurrence after LT

INDICATION FOR LT:
Unresectable HCC confined to the liver

- Macrovascular invasion
- Extrahepatic spread

Contraindication for LT even when cleared by preoperative chemotherapy
Pediatric HCC: Outcome

Overall actuarial Survival Rates after OLTx

1 year 86%
5 years 63%
10 years 58%

The primary cause of death was recurrence of HCC in 86% of the patients.

Risk factors for recurrence
• Macrovascular invasion
• Nodal disease
Limited role for cytotoxic chemotherapy in the management of adult patient with HCC due to low response rates

**POTENTIAL BIOLOGICAL DIFFERENCES BETWEEN PEDIATRIC AND ADULT HCC**

- SIOPEL-1 Study (1994-1998) neoadjuvant PLADO: Partial Response 49%
- SIOPEL-3 Study (1999-2004) “Super-PLADO”: Partial Response 40%
- SIOPEL-5 Study: is evaluating non cirrhotic HCC patients staged according to the PRETEXT system and receiving neoadjuvant PLADO + Thalidomide followed by surgery and post-operative metronomic chemotherapy

**ALL PATIENTS WITH ADVANCED HCC REQUIRE EARLY REFERRAL TO LT CENTERS.**
Hepatocellular Carcinoma

Patient Survival

Kaplan–Meier survival estimate from diagnosis-HCC

PLUTO Registry

Network for Organ Sharing 1989-2007. Among 8,047 patients, 2,37 were hepatocellular carcinoma for other tumors.
PLUTO Registry

Collection of:

1. PRETEXT (at diagnosis and at transplantation)
2. Chemotherapy
3. Immunosuppression
4. Histologic subtype
5. Vascular invasion (gross vs. microscopic)
6. Metastases
7. Multifocality
8. Size - number of nodules of the tumor

Role of Milan Criteria in Pediatric OLTx?
EXTRAHEPATIC RECURRENCE:
12.2% of patients with HB: 3 died and 3 were alive at last FU
25% of patients with HCC: 1 died from infection and 3 were alive at last FU
Only one patient with HEHE alive at last FU

CAUSE OF DEATH:
10% of HB (Recurrence, Chronic rejection, Portal Vein Thrombosis
6% of HCC (Infection)

PRE-LT LUNG METASTASES:
6 patients with HB presented with lung metastases. All cleared their lungs with pre-transplant chemotherapy.
1/6 relapsed 3 months after transplant (Death 7 months from LT)
5/6 alive 5, 8, 23, 24, and 25 months post-transplant, at last FU.
Pediatric Liver Tumors

**MALIGNANT LIVER TUMORS**

- Hepatoblastoma (HB)
- Hepatocellular Carcinoma (HCC)
- Hepatic Hepthelioid Hemangioendothelioma (HEHE)
- Undifferentiated, embryonal and Rhabdoid Sarcomas, and Angiosarcoma

**BENIGN LIVER TUMORS**

- Hepatic Adenoma/Adenomathosis (HA)
- Hepatic Hemangioma/Hemangiomatosis Esiste???
3rd indication for liver transplantation owing to unresectable liver tumors in children

Primary malignant HEHE has an incidence of <0.1 per 100 000.
Mean ages at transplantation for HEHE: 10.5 y.

Variable clinical course

No place for chemotherapy

According to the current UNOS database, the results of OLT for HEH in adults show
5-yr patient and allograft survivals of 65.3% and 57.5
Hemangioendothelioma

Treatment

- **Hepatic resection**: after resection, HEH can behave aggressively plausibly as a result of the hepatotrophic growth factors released after liver resection.

- **OLTx**: Often unresectable for bilateral liver lesions; Five-years survival rates 64%.

**PEDIATRIC PATIENTS TRANSPLANTED FOR HEHE HAVE EQUIVALENT OUTCOMES WHEN COMPARED TO NON-TUMOR PEDIATRIC TRANSPLANTS, PATIENTS TRANSPLANTED FOR HB, AND RARE LIVER TUMORS**

Guiteau - Pediatr Transplantation 2010: 14: 326–331
Pediatric Liver Tumors

- **MALIGNANT LIVER TUMORS**
  - Hepatoblastoma (HB)
  - Hepatocellular Carcinoma (HCC)
  - Hepatic Hepthelioid Hemangioendothelioma (HEHE)
  - Undifferentiated, embryonal and Rhabdoid Sarcomas, and Angiosarcoma

- **BENIGN LIVER TUMORS**
  - Hepatic Ademoma/Adenomathosis (HA)
  - Hepatic Hemangioma
Adenomathosis (HA)

Rare disease (4 previous reports of liver transplantation for HA within the pediatric population) with 4 reported cases of HA progressing in HCC

Risk of rupture with hemorrhagic complications: 46–62% (solitary adenoma 25–35%)

Treatment:
- Observation
- Embolization
- Ablation
- Resection
- OLTx

The patient should have close follow up for the development of new lesions. The current recommendation is that these patients be followed with yearly imaging of the liver as well as yearly alpha fetoprotein level measurements.
Adenomathosis (HA)

INDICATION FOR TREATMENT OF HA

**Resection**: symptomatic and/or enlarging. No extra-hepatic disease and ability to preserve >20% of functioning liver.

Some authors have advocated for resection of only the largest and most vulnerable lesions (i.e., subcapsular, exophytic, and hemorrhagic lesions)

**OLTx**: lesions that cannot be surgically resected, hemorrhagic or HCC development

- In the explanted livers many more adenomatous lesions at gross examination than were identified with pre-operative imaging studies
Adenomathosis (HA)

CENTER EXPERIENCE  →  1 CASE

14 y.o., girl
• biopsy proven multiple hepatic adenomatosis
• repeated resection of major nodules
• progressive evolution
PERCHE’ INTRODURRE IL TRANSPLANT BENEFIT?

INDIVIDUAL BENEFIT (GAIN OF LE)

The benefit of LT is better appreciated in terms of gain of LE (linked to recipient age and alternative treatment) than in terms of survival

Lee HS. Dig Dis 2007; 25: 296