REPORT

OF

AFFORDABLE LIVER TRANSPLANTS CONCLAVE 2021

18th October 2021

2pm to 4.30pm IST (Webinar)

Organised by

THE
PRAVIN AGARWAL
FOUNDATION

Enabling Liver Care for Children

Registered Office: Sterlite Technologies Limited, Godrej Millennium , 4th Floor, CTS 12/1, Koregaon Park, Pune- 411001, India Office: , Maharashtra

About Affordable Liver Transplants Conclave

The Pravin Agarwal Foundation (TPAF), the brainchild of ***Mr Pravin Agarwal, Chairman Sterlite Power Transmission limited and Vice-Chairman Sterlite Technologies Limited*** is a philanthropic organisation dedicated to making paediatric liver transplants accessible, affordable and available for every child in need despite his/her socio-economic-cultural background. Since its inception in 2016, the foundation has helped around 300 kids get a liver transplant done through various fundraising campaigns.

At TPAF, we aim to touch 1000 lives in the next calendar year and help paediatric liver patients get a new lease of life. A healthy child with a healthy liver can do wonders for society and the nation.

The journey of TPAF started as a fundraiser enabling families and patients to acquire the required funds needed to undergo a liver transplant. With time, team TPAF evolved as an ecosystem enabler making a significant shift in the paediatric liver care space, partnering and collaborating with hospitals, healthcare experts, NGOs, Government organisations, renowned hepatologists, liver transplant surgeons, other funders to facilitate paediatric liver transplants at affordable costs and widen the scope of accessibility of quality care and comfort.

One of the major initiatives taken by TPAF is to organise their annual roundtable meets **Affordable Liver Transplants Conclave (ALTC).**

Over the years, this roundtable meeting has emerged as a knowledge-sharing platform, initiating a dialogue among the various knowledge experts in the fraternity.

Every year we get a great mix of professionals from the medical and non-medical fraternity to join us in this roundtable to talk about various aspects of liver disease, challenges of transplantation, and post-care hurdles.

TPAF believes in providing holistic help, so we don't just stop our association with patients with funding but extend our services and support through various support groups and care management programs post-transplant.

With the pandemic making our lives difficult, it has not spared the little ones with chronic liver disease, so it becomes crucial to know about the developments in this arena regarding COVID-19.

However, our discussions are not restricted to the pandemic, our experts will also throw some light on the pressing concerns beyond the obvious challenges for both patients and caregivers.

We hope that the conclusions and outcomes of our panel discussion help the partakers and the ecosystem enablers in the long run to ease the burden of paediatric liver transplants.

Panel -1
Topic - ***Management of COVID-19 in children with liver disease and liver transplant***
Points to highlight: 1. *Management of COVID-19 in children with liver disease and post-transplant* 2. *Strategies to handle large scale COVID-19 complications in children with co-morbidities* 3. *Current data from India on use of organs from donors who have had COVID-19*

Introduction: The panel discussion started by highlighting the most crucial topic - managing COVID-19 in kids and reducing mortality risks during the recent crisis. With a lot of sharing of ideas, opinions and experiences of the speakers and the moderator, the fruitful discussion did throw light on ways to manage COVID-19 in kids with liver disease and how to improve their chances of survival in the recent crisis.

Moderator	Designation
Dr Neelam Mohan	Director Department of Paediatric Gastroenterology, Hepatology & Liver Transplantation Medanta – The Medicity Hospital, Gurgaon
Panellists	**Designation**
Dr Anurag Shrimal	Lead Consultant - Pancreas and Paediatric Liver Transplantation, Consultant - HPB, Liver & Pancreas Transplant Surgery, Global Hospitals, Mumbai
Dr Naresh Shanmugam	Director- Women and Child Health, Senior consultant & Clinical Lead, Paediatric Liver & Gastroenterology, Dr. Rela Institute & Medical Centre, Chennai
Dr Sudhindran S	Clinical Professor and Chief Transplant Surgeon, Department of Gastrointestinal Surgery and Solid Organ Transplantation, Amrita Institute of Medical Sciences, Kochi

Facts about COVID-19 manifesting in children

• The sero-surveillance reports say that though few in numbers COVID-19 infection in children above ten years of age occurs in a similar frequency to that of adults.

• The infection is less severe in children than adults. Occasionally, the infection is asymptomatic or mildly symptomatic in the majority. It is uncommon to have moderate to severe COVID- 19.

• Children with co-morbid conditions have more severe manifestations and poorer outcomes

How COVID- 19 affects the liver

- The virus is associated with significant morbidity and mortality in patients with liver disease as compared to the general population.
- People with cirrhosis [liver scarring] may be at increased risk of COVID-19 infection
- People with pre-existing liver disease (chronic liver disease, cirrhosis, or related complications) who were diagnosed with COVID-19 are at higher risk of death than people without pre-existing LD
- There are new theories that say COVID-19 infection can affect the liver - Leaky gut and production of toxins travelling to the liver via the portal vein, Additional mechanisms of damage might include the intestine abnormal permeability, viral persistence in enterocytes, dysbiosis, viral translocation

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Children with chronic liver diseases: What their parents should know

Point of view: Dr Naresh Shanmugam

"Parents of kids who suffer from one or the other form of chronic liver disease should vaccinate themselves on priority to reduce the incidences of viral transmission from parent to child. Studies suggest that COVID-19 infection can be severe in children with liver diseases, particularly NASH cirrhosis. NASH (or nonalcoholic steatohepatitis) is a type of NAFLD (Nonalcoholic fatty ***liver disease)*** *that can damage the liver when the fat build-up in the liver leads to inflammation (hepatitis) and scarring. However, this kind of cirrhosis is less seen in the Indian paediatric population. What we see more in the Indian population is ascites, liver failure due to malnutrition, use of steroids due to other auto-immune diseases. The COVID-19 infection mildly affects children with mild to moderate liver disease and harshly affects those who have a severe form of liver disease.*

"Parents should never tamper with ongoing steroid medications of kids to treat a COVID-19 infection, but reach out to the doctor to know what is the best practice to be followed. But for kids who have a severe liver disease, parents should be more careful – isolate them, follow the COVID-19 guidelines to ensure minimal chances of viral transmission."

COVID-19 infection: Signs the parents should look for- pathologically/ histologically and by general observation

Point of view: Dr Naresh Shanmugam

"Essentially it is seen that the COVID-19 virus attaches to the AS2 receptors and multiplies, the organ liver has large number of AS2 receptors, but the COVID-19 virus is not hepatotropic in nature, which means it doesn't affect the liver or multiply over there. The impact the virus has on the liver is secondary. In few cases there is a slight rise in liver enzymes and in severe cases the COVID-19 infection can manifest as jaundice, which is rare. However, even the slight rise in liver enzymes could be due to the use of drugs and might not indicate a COVID-19 infection."

Use of drugs in paediatric liver disease patients

Point of view: Dr Naresh Shanmugam

"In particular, it is said that NSAD drugs (non-steroidal anti-inflammatory drugs is a class of analgesic medication that reduces pain, fever and inflammation) can cause trouble in patients with COVID-19 related illness, but in reality, any drug can cause trouble. Initially, it was thought that even Ibuprofen can cause trouble, but the FDA has cleared the air stating that Ibuprofen doesn't affect the liver. However, it is not just the drugs used to treat COVID-19 in patients with liver disease that we should worry because any type of drug can cause elevation of liver enzymes. As long as the elevation is not twice the normal limit, we should not worry about ill-effects of the particular drug used to treat COVID-19 infection."

COVID-19 and paediatric liver disease: What the data says

Studies have pointed out that children with A cirrhosis and COVID-19 disease have a mortality of 17.3%. In comparison, those with B & C cirrhosis and COVID-19 have a mortality of 41.2 %, and children with liver transplants and COVID-19 have 18.2%.

Point of view: Dr Naresh Shanmugam

"Personally, I feel there have not been high mortality in children with COVID-19 and liver disease. While there was hospitalisation due to COVID-19 even in children with liver disease, the symptoms subsided with routine treatment and following the protocols."

Are paediatric liver patients at risk of developing COVID-19 infections? Some bare facts:

• Susceptibility to SARS-CoV-2 infection was similar in different patients, regardless of the underlying CLD

• Despite a high incidence of observed suspected cases, the absence of significant clinical events and a favourable outcome, even in confirmed COVID-19 cases

• Thus, underlying liver disease in paediatric patients does not represent an additional risk factor for severe COVID-19

• COVID-19-related liver injury presents with a mild elevation of transaminases

• Children with CLD, including those with AILD and post-LT, do not have an increased risk for severe disease course of SARS-CoV-2 infection with little or no liver dysfunction

• Ensure normal standards of care while adhering to national Covid-19 guidelines, and particularly to maintain immunosuppressive medication to prevent relapse or rejection

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Obesity and COVID-19: Are obese children predisposed to the infection?

Point of view: Dr Anurag Shrimal

"Obese kids are at risk of developing severe type of COVID-19 infection. Data suggests that prevalence of metabolic associated fatty liver disease is 7.6 % in non-obese kids and 34.2 % in obese kids. In fact, obesity increases the risk of a COVID-19 infection by 6-fold."

Impact of COVID-19 on Children's health

Point of view: Dr Anurag Shrimal

"Lack of physical activity and isolation has impacted the kids in many ways. It has also been a cause of obesity in kids in the recent past. For paediatric liver transplant kids, we do have protocols to follow to help them stay fit. The challenge that we have faced is also the extensive use of telecare and telemedicine to ensure a proper follow up of these kids."

COVID-19 infection in chronic liver disease and liver transplant recipients: guidelines to follow

Point of view: Dr Anurag Shrimal

"Children with COVID-19 and liver diseases are segregated into mild, moderate and severe and then treated accordingly. In cases of severe infection doses of immunosuppressant are reduced but a timely call is taken whether or not to keep steroids on hold along with other medications."

Acquiring organs from deceased/live donors who had COVID-19

Point of view: Dr Sudhindran S

"During the first wave, there was some hesitation in accepting donors who recovered from COVID-19. First, with the live donors, there was no literature or case study available to assess how the transplant will affect the donor because it takes seven weeks for the donor to recover from the time of infection. There was also a subsequent fear of transmission from the recipient to donor, though this scenario is rare and not reported much. There have been 21 liver transplants from our institute, where donors were COVID-19 positive (recovered). Of them, seven were deceased donors and 14 were live donors. The recipients did well and didn't develop a COVID infection (covid hepatitis), except for one.

"So, the take home message is if you have a live donor, you can take a part of the organ after 4 weeks in case of mild COVID-19 and 3 months in case of severe infection. In case of a deceased donor, the organ can be taken between 3 weeks to 3 months."

Vaccination and children with chronic liver diseases

Point of view: Dr Sudhindran S

"Children with chronic liver disease and liver transplant should be vaccinated on a priority basis. Especially kids who have undergone a liver transplant as their immunity is low. In fact, there is some soft data stating that children with liver transplants should get vaccinated after four weeks of transplant and might have to go for a third booster shot even after the recommended two doses."

COVID-19 outcomes in children with liver transplant

Point of view: Dr Sudhindran S

"Post liver transplant, in our institute we got four kids who acquired the COVID-19 infection in the first three months. But recovered fine. Post three months, 14 kids with COVID-19 infection were reported. Five of them needed hospitalisation but all of them recovered from the infection. So, it was seen that the infection post-transplant was not as bad as it was expected."

Panel 2
Topic - Exploring new techniques to overcome donor shortage for PLTs
Points to highlight – 1. *Strategies & policies: Expanding the donor pool for children* 2. *Use of machine perfusion, its indicators and factors affecting its success* 3. *Feasibility of using organs after cardiac deaths and from older donors for PLTs*

Introduction: The panel discussion highlighted another crucial topic related to paediatric liver transplants – how the shortage of donors affects the paediatric liver transplant patients and what can be done about the same. The discussion and exchange of dialogue among the panellists did bring forth some exciting aspects to tackle this donor shortage problem.

Moderator	Designation
Dr Sonal Asthana	Senior Consultant, Department of Hepatobiliary Surgery and Multi-organ Transplantation, Aster CMI Hospital, Bangalore
Panellists	**Designation**
Dr Vivek Vij	Founder & Chairman, Liver Transplant, Hepato-Pancreato-Biliary Surgery, Fortis Healthcare Limited (Group Level)
Dr Hynek Mergental	Consultant Surgeon at the Liver Unit at the Queen Elizabeth Hospital and honorary Senior Lecturer at the University of Birmingham, UK
Dr Prashant Bhangui	Associate Director Hepatobiliary Surgery and Liver Transplantation Surgery, Medanta-The Medicity Hospital, Gurgaon

Paediatric load in India: What we should know

Point of view: Dr Vivek Vij

"Paediatric load in a country like India is high, and the transplants we do is very low. Looking at numbers, we know that we are doing far fewer transplants. Also, it is a personal experience that parents in India aren't keen on getting a liver transplant done for their child. There could be two reasons for this – we don't have good paediatric programs or they are unaware of paediatric liver

transplant outcomes. Another hurdle that parents face is also of the funds – paediatric liver transplant also needs monetary support. In Tamil Nadu, the government funds the cases to be

a bit higher than other states. But we need to understand that to increase the number of paediatric transplant cases; we need to address the chain of events – funding, counselling, post-transplant support and then increase the number of paediatric transplant cases.

"While getting a living donor or even a deceased donor for the paediatric population is a challenge, but the most prevalent one is to make the parents aware that liver-transplant is a life-saving surgery which can improve a child's chances of survival so we have a chuck of patients to help."

Living donor transplant: The challenges and strategies

Point of view: Dr Vivek Vij

"As compared to adult transplantation, it is much safer to take a chuck of liver from an adult for a paediatric liver transplant, as a very small chuck of the liver is taken out for the purpose, just 10-20 percent. Therefore, the complications are much less, and the procedure is relatively safe. We should also highlight that with the advent of minimally invasive surgery, a part of the liver can be extracted laparoscopically or through robotic surgery, which is much safer. This makes it safer to donate and also helps the donor to recover soon. These are some of the points we should highlight among the masses so families can decide about becoming a donor and saving the child's life.

"There are deceased donors available for PLTs, but before we jump into split liver transplants for paediatric and adults, machine perforation, we need to create an awareness about the outcomes of paediatric liver transplant so people are more forthcoming."

Adopting new technologies to overcome donor shortage for paediatric transplantations: Machine perfusion

This new form of technology is making waves in the paediatric liver transplant fraternity. Especially in the western world, where there is a decrease in deceased donor pool, machine perfusion is considered a game-changer. It is a safer procedure for the recipients too. Machine perfusion is a technique used in organ transplantation to preserve the organs that are to be transplanted. Machine perfusion has various forms and can be categorised according to the temperature of the perfusate: cold and warm.

Point of view: Dr Hynek Mergental

"Dynamic preservation with machine perfusion prevents organ quality decline and significantly improves transplant logistics and preservation times. It provides objective assessment of liver function/quality. This helps us get access to quality liver graft for paediatric population."

There are four kinds of perfusions:

- **Hypothermic (non-oxygenated) machine perfusion (Guarrera et al. 2010)**
- **Normothermic regional perfusion (Fondevila et al. 2011)**
- **Hypothermic oxygenated machine perfusion (Dutkowski et al. 2014)**
- **Normothermic machine perfusion (Ravikumar et al. 2016)**

Normothermic machine perfusion:

- Can be started at the donor hospital (preservation) or recipient centre (reconditioning)
- Liver at fully functional condition, supplied with oxygen and nutrients
- Allows real-time assessment from perfusate / bile analyses (Birmingham protocol)
- Extends organ preservation times (currently up to 30 hours)
- Recovers liver metabolic substrates (ATP, glycogen)

Hypothermic oxygenated machine perfusion:

- Performed at recipient centres, non-portable devices, 1-3 hours prior to implantation
- Restores liver ATP without triggering pro-inflammatory cascade during reperfusion
- Reduces non-anastomotic biliary strictures in DCD livers (van Rijn et al. 2021)
- May provide some information about liver viability

Normothermic regional perfusion:

· Perfuses all intra-abdominal organs
· Promising results from case-control studies
· Most cost-efficient per organ perfusion

What we can expect from machine perfusion

Point of view: Dr Hynek Mergental

"In the future we can hope for extended preservation times that will open new horizons in organ sharing. Improved logistics will allow optimal transplant timing and on-machine splitting may prevent technical complications too. Targeted interventions tailored to improve transplant outcomes."

How to expand the donor pool to favour paediatric patients? The challenges we face

Point of view: Dr Prashant Bhangui

"Primarily, the paediatric liver transplant population is an underprivileged population regarding deceased donor liver transplantation. The Indian data suggests that living donor liver transplant (2017-21) in the paediatric population was just 18 % compared to the adult population, which records 82%. Also, deceased donor liver transplant corresponds to 6 % of the paediatric liver transplant compared to 94% in adults. There is a long waitlist for the paediatric pool because of the scarcity of size-matched whole grafts harvested from young size-matched donors. The other factor is: Ideally, one would want to have the ideal donor for the paediatric group (even if you have to split the liver), but more borderline grafts are available. So, there is a reduction in several livers suitable for splitting. So, the waiting time for paediatric patients keeps increasing.

"The challenge for the surgeons is to place a paediatric liver patient on the wait list as they know probably the recipient won't get an ideal liver."

Paediatric DDLT: Possible changes in allocation

Point of view: Dr Prashant Bhangui

- Paediatric DBD donor livers (till 18 years of age) should be first offered to paediatric patients on the waiting list
- Paediatric ALF patients with no prospective living donor – a priority for DDLT – mandatory split whenever feasible (good quality liver, stable donor, experienced operating team)
- Split liver for a paediatric recipient in young, stable DBD donors (preferably in-situ split) when an experienced operating team is available, and conditions are suitable
- A better coordination between centres (for within state as well as for inter-region organ sharing) for liver splitting and paediatric transplants
- Borderline (steatotic, older, DCD) livers – test the machine and split during perfusion if feasible

Panel -3
Topic - Promotion of Wellness amongst PLT patients and their families
Points of discussion: 1. *Long term medical care of paediatric transplant patient* 2. *Best diet and nutrition practices to be followed post-transplant* 3. *Role of support groups - Managing the needs of patients and carers*

Introduction: This panel discussion focussed on the importance of the aftercare and challenges one faces post-transplant. A liver transplant is not just a one-time process. It needs continuous support and care. The dialogues exchanged between the panellists and moderator did bring out excellent ideas and strategies that can become guidelines for post-operative care management.

Moderator	Designation
Mr Ayan Chatterjee	Head – CSR, Sterlite Power Group & Sterlite EdIndia Foundation, Honorary Strategic advisor for TPAF
Panellists	**Designation**
Dr Smita Malhotra	Consultant, Paediatric Gastroenterology-Hepatology, Indraprastha Apollo Hospitals, New Delhi
Ms Sreemathy Venkatraman	Chief Clinical Dietitian, BRAINS Hospital, Bangalore, National Office Bearer- Central committee-IAPEN-INDIA, Executive Director- Dysphagia INDIA
Ms Jaya Jairam	Project Director, MOHAN Foundation, Mumbai

Strategies to strengthen the post-operative care ecosystem: What can be done

Point of view: Dr Smita Malhotra

"It is essential to make the parents or the caregivers understand that transplant is just one part of the story. Post-operative care and support is also a considerable challenge. Once the transplant is done, they have to take care of the medications and tests before follow-ups to ensure a patient's well-being. This becomes a huge financial burden for the family. In addition, funds have to be arranged for post-operative care, as the cost of medications and tests is an added stress for many families.

"Some strategies that can help to lessen this burden are :

*"**Funding through NGOs or organisations:** Just like TPAF funds for transplant, organisations can come forward to help people with post-operative expenses too. This can happen with the help of NGOs, government initiatives or even individual charities.*

*"**Compliance with medications:** Most of the time, post-operative complications can arise like – infections, strictures, need for readmission or even surgery. Caregivers should be counselled to comply with the post-operative care protocols to ensure fewer complications happen and give medications on time to patients. Also, with some help from pharma companies, the cost of these post-operative drugs can be taken care of if a better patient management program comes into action.*

*"**Practising good hygiene:** Parents must practice good hygiene post-transplant to limit chances of infections and also a need for readmission or surgery.*

"These steps could help to lessen the financial burden on caregivers, post-transplant."

Best practices to be followed post-transplant in terms of nutrition: What can be done

Point of view: Ms Sreemathy Venkatraman

"Malnutrition is prevalent among the Indian paediatric population on a large scale. It also affects kids who are suffering from liver diseases or get a transplant done. One needs to take extra care of a child post-transplant, especially if the kid is suffering from malnutrition. Parents or caregivers need to be counselled to give kids nutrient-dense foods in the right proportion. Different parts of our country have different cuisines, so it is critical to have a detailed nutrition plan to help parents give their kids the best nutrition without compromising growth and well-being. They should focus on the macronutrients and nourish the child with the right mix of micronutrients. Remember, the first 12 months post-transplant is critical so one needs the right diet and nutrition for proper growth and healing.

"However, there are many challenges that a parent can face while ensuring proper intake of nourishment, post-transplant. There could be behavioural eating problems due to lack of appetite, pain or general irritability after the surgery. Parents need to be counselled to help the child overcome these hurdles to ensure proper intake of food. During follow-ups, a proper body analysis should be done to know if the child lacks any kind of nutritional support.

"The major challenge is to keep the child in the range of optimal weight without compromising on other parameters. It is often seen that a child is either gaining too much weight or too little weight post-transplant. Both of these scenarios could be harmful for the child. This often happens if the child is missing out on oral supplements or having the wrong kind of foods like raw foods (that can increase chances of infections), not following proper hygiene guidelines etc.

A detailed nutritional plan should be in place to help parents follow the dos and don'ts and also have enough choices to help the child cover all aspects of nutrition."

Role of support groups: Why we can't do without them

Point of view: Ms Jaya Jairam

"Support groups are like the moral support system that exists to help patients and caregivers know that they aren't alone. While there are a lot of experts and advanced medical help all around the corner, the role of the support groups is to compliment the efforts taken by every stakeholder in the ecosystem and consolidate the support and care provided. There is a lot that people have to go through after a transplant. It is like a roller-coaster ride. While there is too much happiness and gratitude there is also room for guilt and foreboding. Also, there are various questions in the minds of the patients and caregiver – how to handle a toddler who doesn't understand why he/she should remain isolated, how the family members should react with the patient at home, what to do if sugar levels rise post-transplant – questions that people have and don't know where to look for answers. But they find themselves at ease with other members of the group who can put their mind to rest. Many times, support group members help each other take some informed decision about post-operative care. Support groups are like that social network support or community support that makes survival and healing much easier and more stress-free."

Special Talk: Impact of a mandatory split liver policy in Italy

Speaker: Dr Roberta Angelico

MD, PhD, FEBS, HPB and Transplant Unit, Department of Surgery, University of Rome Tor Vergata, Rome, Italy

Introduction: While there is no split liver policy in India, Italy has one in place, and in the recent past, the outcomes in context to paediatric liver transplants have been excellent. Italy has seen many benefits of implementing the mandatory split liver policy. Dr Roberta Angelico shared her knowledge and wisdom with us, elaborating on its impact on paediatric liver transplant outcomes.

Excerpts of the talk

What is a split liver transplant?

Split liver transplant (STL) is a surgical procedure where a healthy liver from a deceased donor (cadaver donor) is split into - left lateral and a right extended graft for one paediatric and adult recipient. This procedure has primarily helped cut down on wait time for patients who urgently need a liver for survival. Over the past years, this procedure has shown excellent outcomes and improved patient survival rates too.
SLT was introduced in 1988 to increase the donor pool for paediatric candidates for LT, in Italy.

The standard technique for SLT is a surgical procedure where a liver graft from a deceased donor can be divided into two recipients, including LLS to a child and ERG to an adult recipient.

Why the need for a split liver policy?

The policy came into existence due to the following challenges:

- *Difficulty to find size-match grafts for small-size transplant candidates*
- *Long-time awaiting LT for paediatric recipients*
- *High paediatric LT mortality*

It has been seen that in the whole of Europe, from the year 2000 onwards, the SLT has been growing in numbers and the outcomes are quite rich. In Italy, the living organ donation for the paediatric population is confined to just 30 %, while most transplants happen through SLT. The scenario is quite different in India.

How is a donor for a split liver transplant selected?

While there are no universal criteria to select a deceased donor for splitting the liver, there are specific guidelines that every country follows. Most countries that have a split liver policy in place have drafted their criteria. The younger the donor better the outcomes. Usually, a

donor less than 60 years of age, with low BMI, near-normal liver function tests and less than 5 days ICU with low inotropic support are considered good donors.

How is the SLT allocation policy implemented?

Few guidelines are followed:

Adoption of in situ SLT: The splitting is done in the donor hospital to reduce the cold ischemic time (CIT). Cold ischemia time (CIT) is a factor that occurs during the allocation, and it is considered a primary, extended donor criterion that affects graft and patient survival. This also poses some logistical and economic challenges, but the outcomes are excellent.

Recipient selection for Extended-right Graft: Once the liver is split, there is the need to find a matching recipient for the adult patient for improved outcomes.

Data on surgical splitting technique were available on 380 cases: 221 (58.2%) in situ and 159 (41.8%) ex situ SLT were performed. The median CIT was 7.2 hours (IQR 6.1-8.8) for in situ procedures, while 9.3 hours (IQR 8.3-11.3) for ex situ splitting technique ($p < 0.0001$). Ex situ SLT was associated with an increased risk of early graft failure ($p < 0.0001$).

What does the mandatory split liver transplantation program in Italy emphasise?

"Mandatory-split" liver allocation policy which came into action in 2015 implies:

- All donor aged 18-50 years with standard risk
- Primary offer to paediatric LT center
- Unless adult urgent or MELD ≥ 30

What are the outcomes of the same?

- Maximizes the SLT donor resources; SLT rate: 8.4% (vs UNOS 2%)
- Reduced paediatric LT waiting-list time median time: 3 months (urgency 2-3 days)
- Paediatric LT-waiting list mortality: 2% (vs UNOS 10%)
- Maintain priority for adult sick LT candidates

Despite the expansion of SLT donor criteria, most split procedures were performed in young donors, proving that paediatric centers had more opportunities to choose the best donor for children.

The takeaway message:

- The use of split grafts permits to achieve excellent outcomes in paediatric LT.
- In Italy, the maximisation of SPLIT LIVER allocation policy, integrated with LDLT activity, almost eliminates the paediatric LT waiting list mortality.
- The SPLIT LIVER program needs a continuous adaption of organ allocation rules, according to the changing of the donor population and adult liver allocation.
- Almost 40% of donors potentially "split table" are not used for standard split procedure (LLS/ERG) and represents a graft resource for adolescents/small adults and for expanding indication in LT

Special talk: Setting up a screening program for paediatric liver disease

Speaker: Anil B Jalan

MD DCH MCPS, Director and Chief Scientific Research Officer
NIRMAN (Navi Mumbai Institute of Research in Mental and Neurological Handicap) Metabolic Clinic, Navi Mumbai

Excerpts of the talk:

The metabolic problem associated with the liver could be of many kinds. However, broadly we can divide them into two categories:

1. Where the liver is dysfunctional or where the liver structure is disturbed, the liver cells fail to function to the optimum, which might need a targeted approach or treatment; failing to respond to it can lead to liver transplant.

2. Another kind of problem might be the involvement of the liver because of the enzyme function. In this scenario, the structure and cells of the liver are standard, but the enzymes secreted lead to liver disease. This group of diseases can also be treated with medication and diet, but a transplant might be needed if there is no response to the treatment.

Screening for metabolic liver diseases right after birth is essential to nip the problem in the bud and ensure that the child is saved from the clutches of liver diseases or a timely transplant is done to improve the quality of life.

How is a new born screened for metabolic liver diseases?

When there is a new born with suspected metabolic liver disease, here are a few things the child should be screened for:

Hepatomegaly/jaundice	+++
Liver cell failure	+/-
Ammonia/Lactate	+/-
Ketones /DNPH	+/-
BSL	Normal/+
Acidosis	+/-

With the results mentioned above, it is necessary to investigate certain metabolic disorders related to the liver. Some of the common disorders are:

- Galactosemia
- Tyrosinemia
- Fructose Aldolase deficiency
- Fructose 1, diphosphatase deficiency

- Neonatal Hemochromatosis/HLH
- Respiratory Chain Defects
- Niemann Pick Type C, NP A/B
- Congenital Disorders of glycosylation
- CPT 1 deficiency
- HLH syndrome

How should one screen/check for these disorders?
Whenever there is a symptomatic child for metabolic liver disease, the following screening tests can be done, to confirm a diagnosis:

- Galactosemia screen
- Tyrosinemia profile
- HPLC profile
- FAOD profile
- Urea cycle screen
- Total bile acid
- Storage Dis Screen

The samples needed for these screening approaches:

- 2 ml heparinised blood
- 2 ml EDTA blood
- 3 ml serum
- 10-15 ml urine

Sometimes, additional studies might also be needed to confirm the diagnosis, such as CDG screening, bile acid isomers, genetic studies, liver biopsies, etc.

Want to know more about these topics? Click the link to watch the whole webinar:
https://www.youtube.com/watch?v=XHFWFSQWSP4&t=5114s

Studies cited:
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