Graft quality and Steatosis; surgeon's perspective

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Marginal Grafts – the "Fear"

Optimal liver graft

Marginal liver graft

?

Ideal graft function post OLT

Initial poor function
- Coagulopathy
- Cardiovascular instability
- Multi-oragn dysfunction
- Renal failure
- Sepsis

Primary Non-function
- Retransplantation
- Mortality

Historical perspective

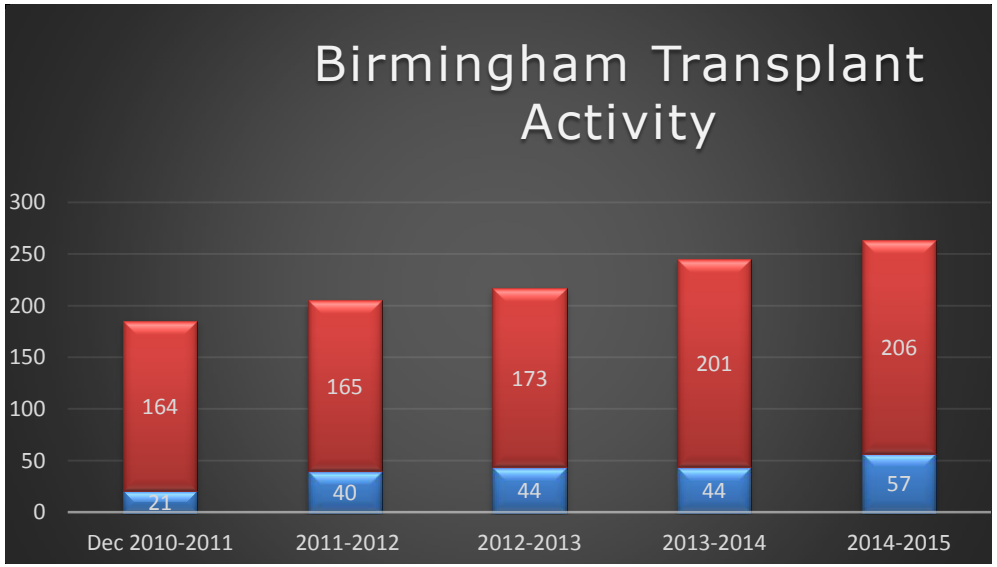
	2001–2005	2006 –2011
Total transplants 1172		
T0 biopsy available	n=211 (36%)	n=374 (64%)
Donor age	53.1 (16.6–72.1)	54.1 (18.0–73.4)
BMI	25.7(16.5–50.8)	25.7 (16.5–50.8)
Steatosis Moderate severe	 36 (17.1%) 10 (4.7%)	 53(14.2%) 3(0.8%)

*Significant perioperative morbidity and mortality
More grafts (n) of moderate severe steatosis has been used in the later era

Trends of usage in steatotic liver grafts over a ten year period. Lordan et al Transplant International 24, 140

Marginal grafts – Current trends

- Transplant data from Declined organs audit
- Dec 2010 – 2015



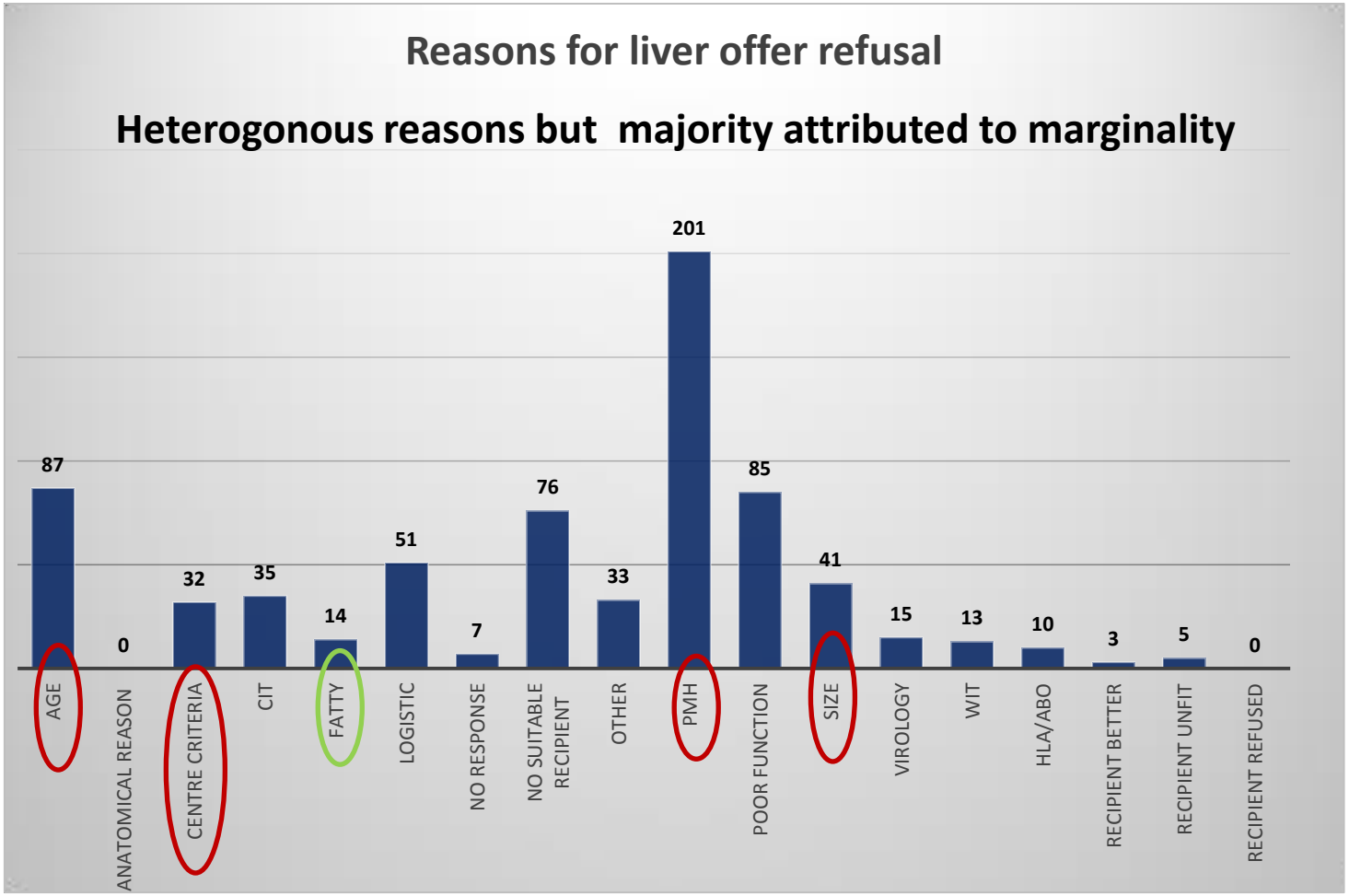
206 / 909 (23%) adult transplants were performed
With declined offers
- DCD (n=65)
- DBD (n=146)

206 liver grafts were refused by 731 times – average refusal rate 3.5/liver graft

Marcon et al. *Transplantation. 2018 May;102(5):e211-e218.*

Marginal grafts – Current trends

- Why do centres reject liver graft offers? Surrogate markers of steatosis



Marginal grafts – Current trends

KEY FACTS

- Subjective marginality at the time of organ offer is the key to determine acceptance / decline
- There was no concordance of centre opinions
  - Heterogonous reasons but majority attributed to marginality
- Average refusal rate is higher for DCD vs. DBD (4.2 vs.3.2)
- Organ failure rate attributable to the graft was 8/206 (3.8%)

Marginal Liver – *the Challenge*

"How to select the best of the lesser grafts to achieve nothing less than the best outcomes……."

Marginal Liver – How far do you push?

- Framework of *guidelines*
  - SaBTO
  - Institutional / local guidelines
  - Age criteria

- Experience of the surgeon
- Information gathered from donor surgeon / reliance
- Visual assessment
- (Lack of) Objective assessment

Contributors to marginality - 1

Donor history

"**Donor has poor history that is surrogate with highly predictive delayed graft function/graft failure**"

- Demographics; Age, BMI
- Previous medical history – T2DM
- Medical history immediate pre-donation
- Significant down time
- Cause of death

Contributors to marginality - 2

Organ function

"Potential organ (Liver) is dysfunctional and likely to fail/temporarily dysfunction; thus recipient may end up with a bad/suboptimal outcome"

- Dysfunction within donor
  - Significantly elevated transaminases
  - Isolated rise in GGT?
- Severe systemic instability impacting liver
- Severe metabolic acidosis
- (Perceived) degree of steatosis

Contributors to marginality - 3

Logistics

"<u>Acceptable donor and graft quality</u> but the logistics would make it more marginal, therefore the outcomes are likely to be negatively influenced"

- Prolonged donor warm ischaemia time
- Organ travel time
- Total cold ischaemia time
- Multiple offers – "already a *pristine quality* liver accepted"

Contributors to Marginality - 4

Retrieval surgeon

- Expertise and experience of retrieval surgeon
- Assessment of steatosis; “over-call”
- Influence the decision making of Transplanting surgeon
- Insight!
- Procurement injury to already marginal graft
- Procurement, packing and dispatch times

Contributors to Marginality - 5

"Transplant surgeon - *calculated risk taker*"

- Digs deep for more information

- Search for evidence in similar organ donation scenarios

- Weighs the risks and benefits, potential use of the graft based on the need

- Calls for opinion! And (more) friends

- Chooses the recipient wisely

- Informs the potential recipient with evidence and documents

Marginal graft – Example 1

DBD offer

- 55 Female
- Height 166cm, weight 110Kg (BMI 40)
- Admitted with 37min down time, one week in ITU
- ALT on admission 661IU down to 163IU on donation
- CRP 115
- No ACIDOSIS
- On double inotropic support
- Blood group O

Marginal!

- Age + BMI
- Improving LFT's but 4x normal
- 7 days in ITU, Possible sepsis

Zonal Allocation centre accepts the offer

Marginal graft – Example 1

Retrieval centre – NORS; not the same centre accepting liver

Retrieval Surgeon –

> "There is large haematoma in the LLS approximately 10x10cm, anterior to posterior".
>
> "MODERATELY FATTY"

- Zonal Allocation centre declines the offer
- Cross clamp pending
- All other centres decline the offer
- Fast Track offer to Birmingham

Marginal graft – Example 1

Our approach

- Blood Group O, DBD
- Haematoma likely from CPR, one week old
  - option to leave alone or reduce the LLS if extensive
- Moderate steatosis
  - "probably over-call"!
- Accept the offer, speak to surgeon and get images
- Buy time by delaying cross-clamping

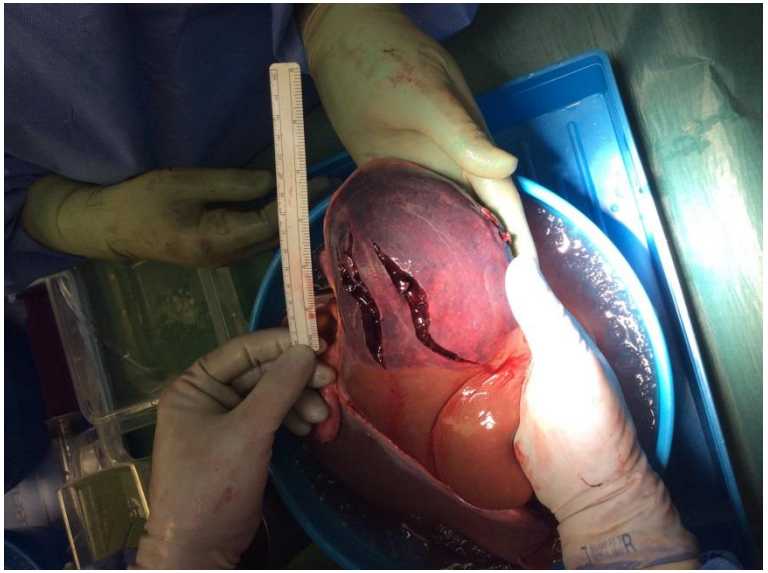
Marginal graft – Example

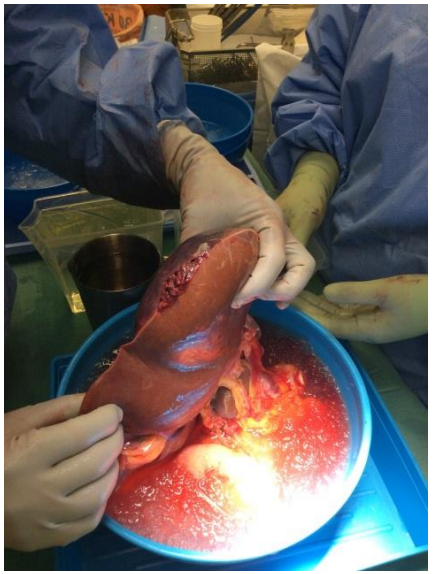
Contact made - Retrieval surgeons confirms Moderate steatosis

- When asked "*would your centre have transplanted this liver disregarding the injury* – declares himself renal transplant surgeon!

Opinion on size -nearly 1.5kg

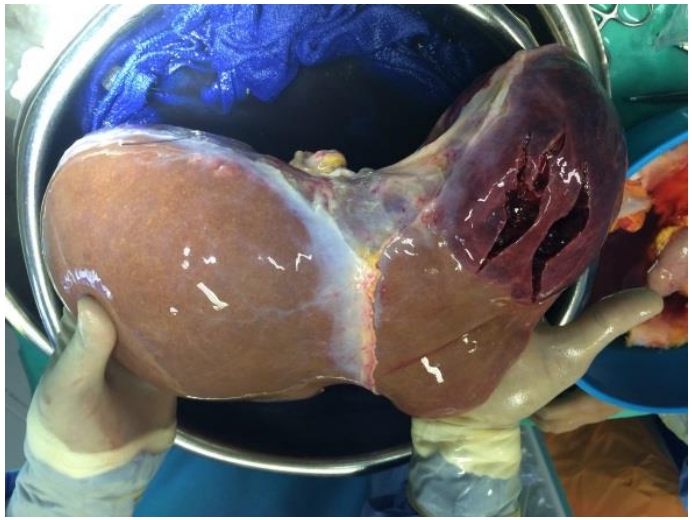
- Helpful in sending pictures; healthy appearance (<u>certainly not moderate steatosis)</u>

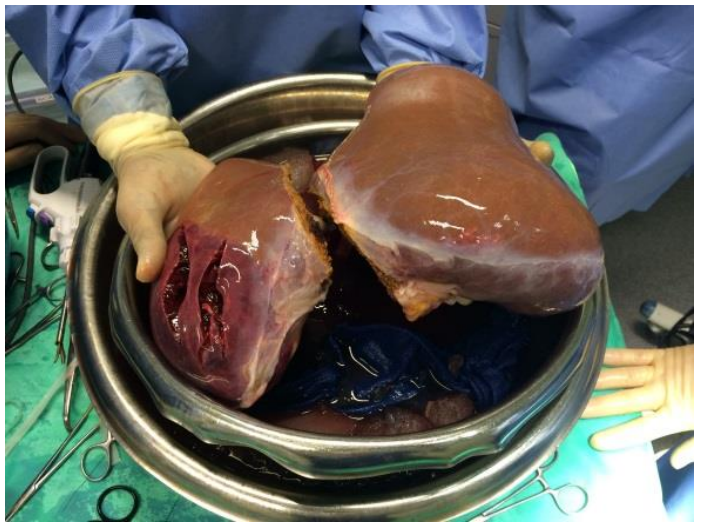




Marginal graft – Example

- Graft was accepted with the plan to reduce the LLS
- Recipient was chosen with graft qualities in mind
- Successful reduction and transplantation – 2 years now with good LFT's
- Residual liver segment for pathology – Steatosis 20%





Marginal graft – Example

Contributors to marginality

- Donor history
- Graft function
- Logistics
- Retrieval surgeon

Game changer – for Zonal centre

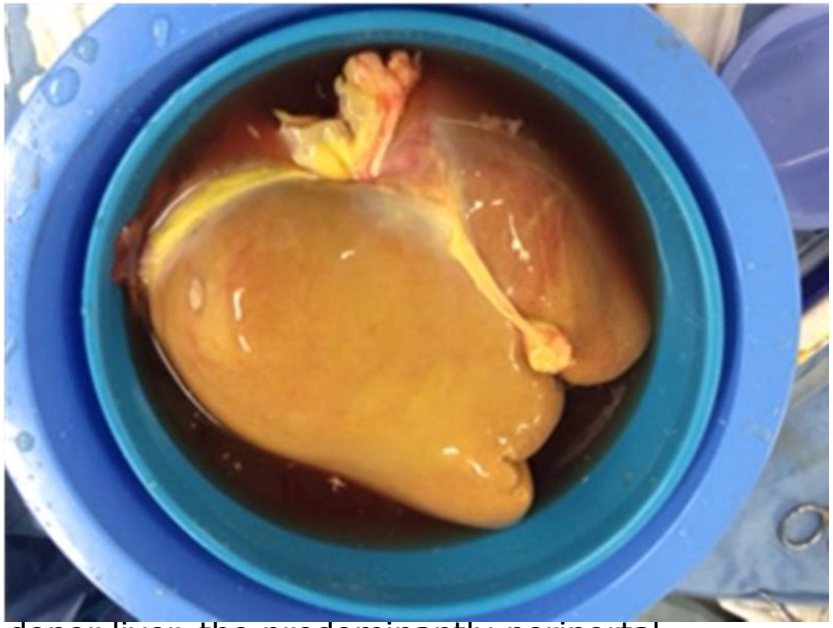
- Unexpected liver injury
- Retrieval surgeon opinion on steatosis

Game changer – for us

- Consideration of technical options
- Non-reliance on retrieval surgeon opinion of degree of steatosis

Marginal graft – Example 2

40y F, BMI - 29, DBD, ICH, at least moderate steatosis, small parenchymal injury segment VI



2.5 kg liver

Time zero biopsy: macrovesicular steatosis (20%);

Strategy – Short CIT and Implant time

Outcome – Reperfusion syndrome
Delayed closure
AKI
In hospital stay 40days
Perfectly well now

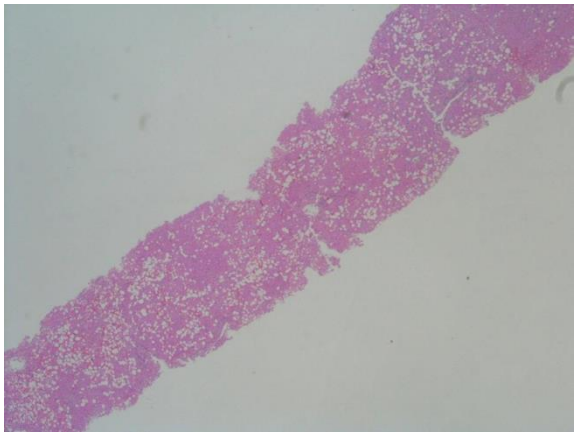
Post reperfusion biopsy - STEATOHEPATITIS affecting the donor liver, the predominantly periportal location of steatosis remains unusual, this is a pattern that is recognised to occur in paediatric fatty liver disease. There could be either an alcohol or nonalcohol related aetiology (Kleiner S1 B1 I1= 3/8 fibrosis 1a/4);

? WOULD YOU HAVE TRANSPLANTED IF Steatohepatitis was known?

Marginal graft – Example 3

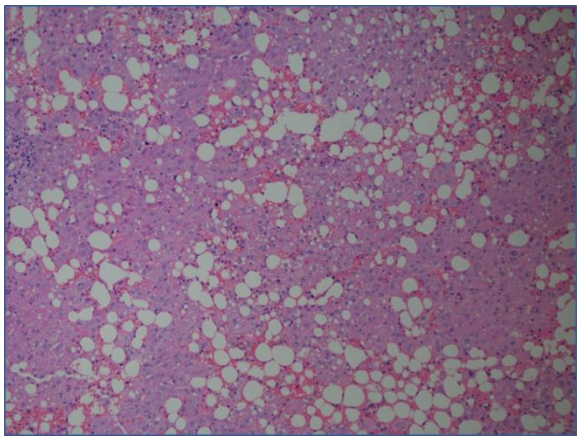
38y DBD, female, mild to moderate steatosis 50-60% Macrosteatosis on T-1

normal anatomy, 2.5 kg liver

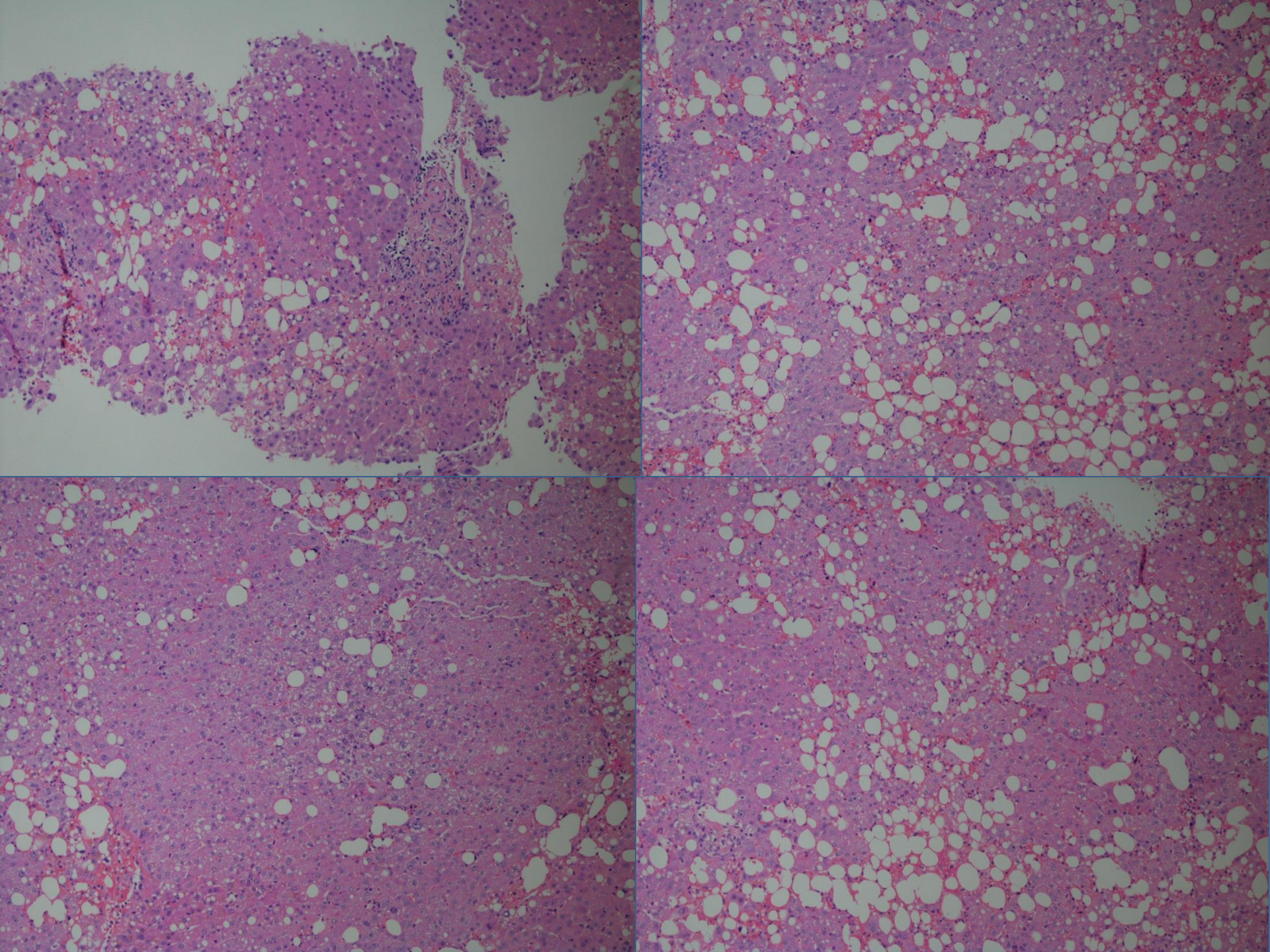


Strategy – CIT - 0902hrs, implant time - 24min;

Outcome – Severe delayed function 24-48hours
AKI
In hospital stay 16 days
Perfectly well now



Post reperfusion biopsy (Shown)
Steatosis – Upper end of Mild (TO MODERATE)



Marginal graft – Example 4

ODT 134543-Rejected liver

66y M DBD

BMI 26
Hypoxic brain injury- OOHCA(Downtime 30 min)
PMH:HTN
heavy drinker(7-9units/day),
smoker
ALT 357, GGT 222, Bi 32

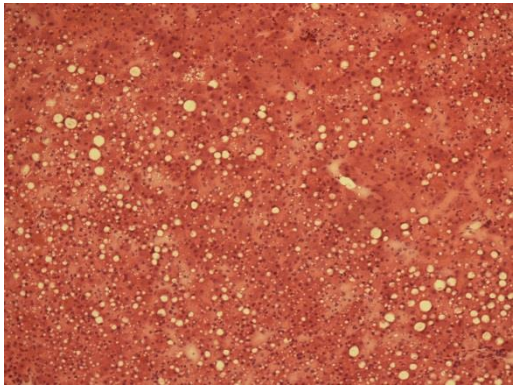
Offered to Named patient in National allocation

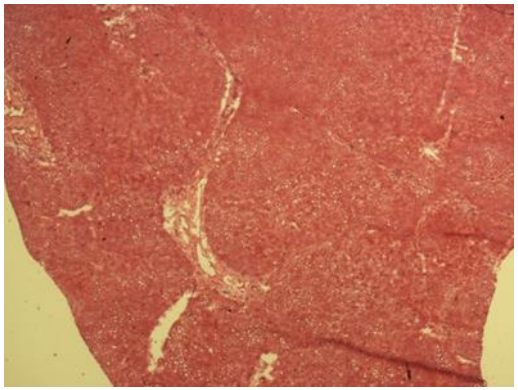
64y F, BMI 33 ,NAFLD (BG O+, UKELD 53) + portal HTN;
PVT grade 2;PMH:T2DM
eGFr 53

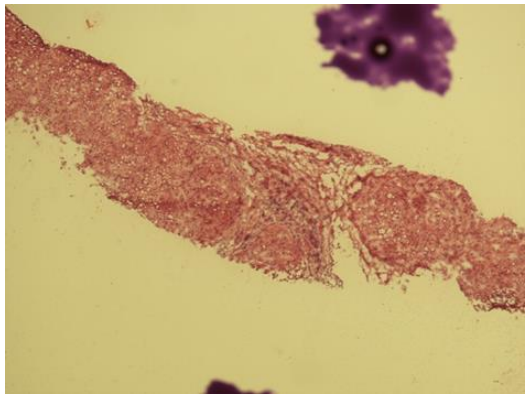
Marginal graft – Example 4

Steatosis only mild to moderate (10%)

Possible fibrous bridge

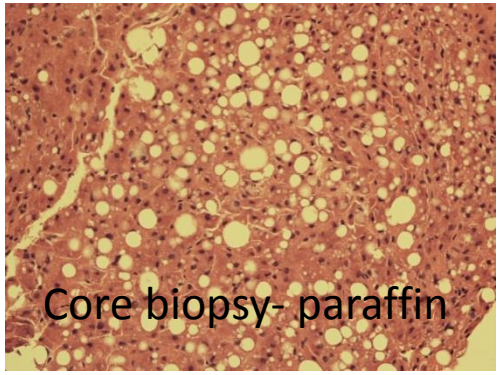




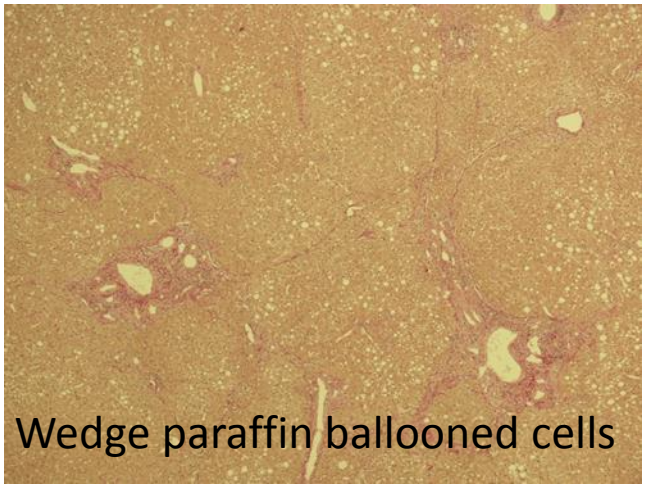


Graft appearance unhealthy and despite 10% steatosis overall risk appears far too much – Transplant cancelled

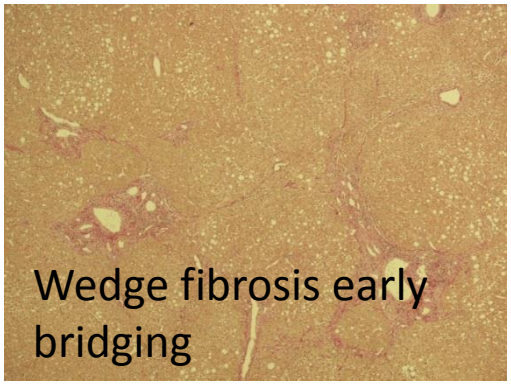
Marginal graft – Example 4



Core biopsy- paraffin



Wedge paraffin ballooned cells



Wedge fibrosis early bridging

Information available later from Paraffin sections

- Steatosis
- bridging fibrosis

Right decision not to transplant!

Histopathology in Liver Transplant

- Takes away subjective assessment from retrieval and transplant surgeons
- Helps surgeons “make a case for” transplant when the freedom to select the appropriate recipient is present (examples 1-3)
- Low degree of steatosis on biopsy does not “bind” the surgeon to transplant organ (example 4)
- Accurate and timely histopathology (digital) may reduce organ decline by primarily allocated centres