# PREIMPLANTATION BIOPSY – DECEASED DONOR TRANSPLANTATION


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# INTRODUCTION

- Marginal cadaveric kidney donors can be defined as:

  All donors older than 60 years, donors older than 50 years with any of the following criteria:

  (1) Hypertension,

  (2) Cerebro -vascular cause of brain death or

  (3) Pre-retrieval serum creatinine (SCr) level > 1.5 mg/dl, with a degree of glomerulosclerosis >15% and prolonged cold ischemia.

- Pre implantation deceased donor kidney biopsy helps in utilizing organs from marginal donors and predict long term outcome.

# SCORING SYSTEMS

- Remuzzi protocol.
- Marryland Aggregate Pathology Index[MAPI].
- BANFF scoring system.
- Leuven scoring system.

- Core biopsy vs wedge biopsy – no much difference in scoring outcomes.

- Expert renal pathologist showed better interpretation of biopsies compared to routine pathologist.

- Stains used Hematoxylin and Eosin stain.
- Also periodic acid–Schiff and Masson's trichrome - useful in evaluating parameters such as hyaline arteriolosclerosis, tubular atrophy, and interstitial fibrosis.

# Evaluation of expanded criteria donors using kidney profile donor index and preimplantation renal biopsy

## Material and methods

January 2010 → June 2019

Kidney transplant (KT) recipients who received an allograft from a expanded criteria donor (ECD)

KDPI was calculated and results were stratified in quartiles

- Q1=86% (n=66)
- Q2=95% (n=72)
- Q3=99% (n=83)
- Q4=100% (n=45)

OPTN
ORGAN PROCUREMENT AND TRANSPLANTATION NETWORK

**And a preimplantation biopsy was performed**

- Glomeruli sclerosed *
- Hyaline arteriopathy *
- Fibrous thickening of the vascular intima *
- Tubular atrophy *
- Interstitial fibrosis *

**Score 0-3 points ***

Accepted for KT until a global SCORE of 7 points

## Results

**N= 266 KT recipients; median follow-up: 46 months**

KT from KDPI Q1 presented better survival (log rank; ***p=0.003***) and Q4 had worse renal function.

Biopsy score >3 was related to shorter survival (log rank; ***p=0.018***) and poorer renal function.

Q1 donors with biopsy score ≤3 had the best survival (log rank; ***p=0.014***).

**Hyaline arteriopathy, glomerulosclerosis, and KDPI Q4** were predictors for graft survival


HR: 2.136 (***p=0.047***)


HR: 2.614 (***p=0.016***)

HR: 4.767 (***p=0.029***)

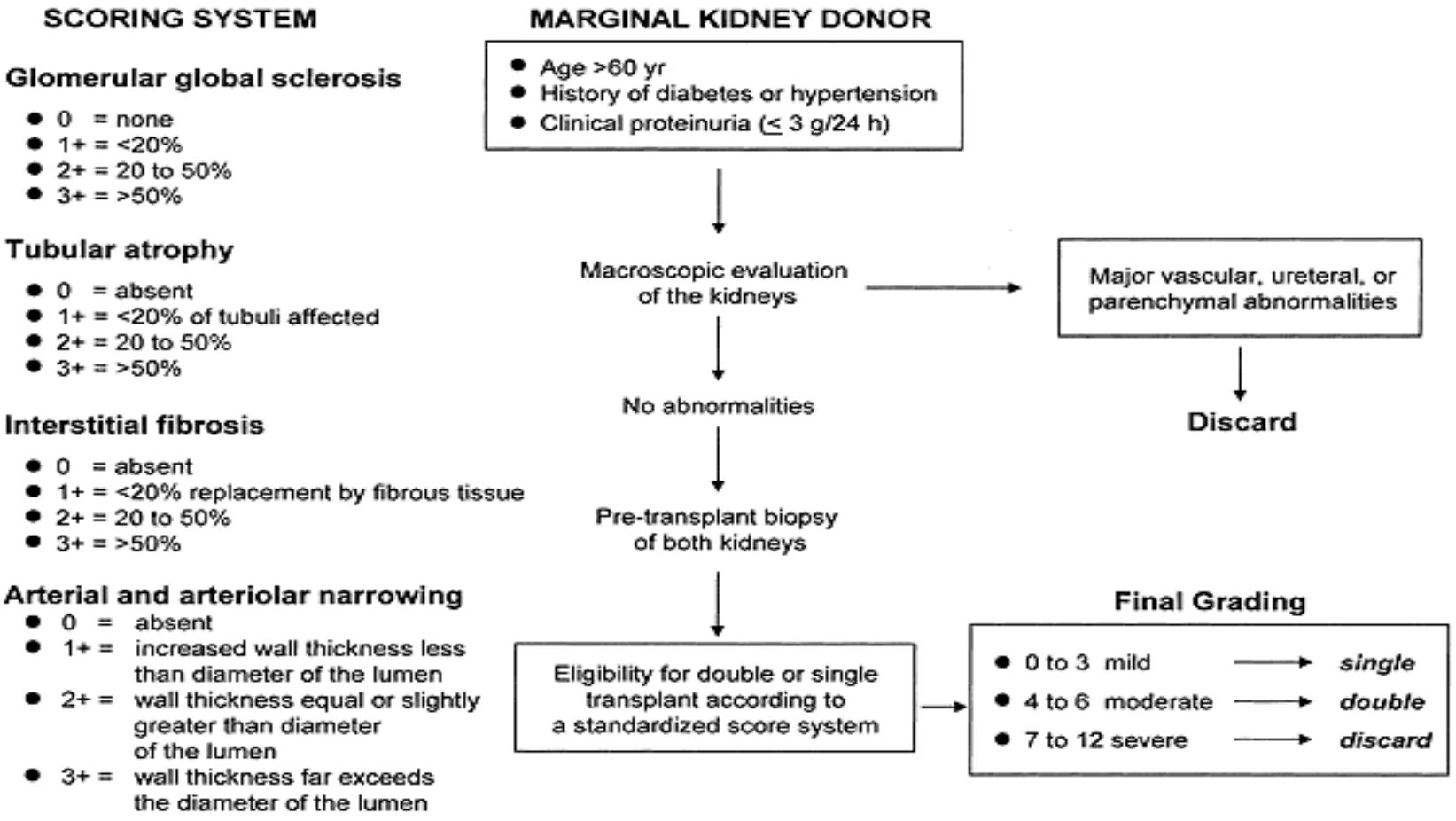
**Conclusions:** KDPI and a greater histological injury in biopsy, especially glomerular and vascular lesions, were related to a higher rate of KT graft from ECD.

ESOT Leading the way in transplantation

Villanego et al. *Transpl. Int.* 2022
doi: 10.3389/ti.2022.10056

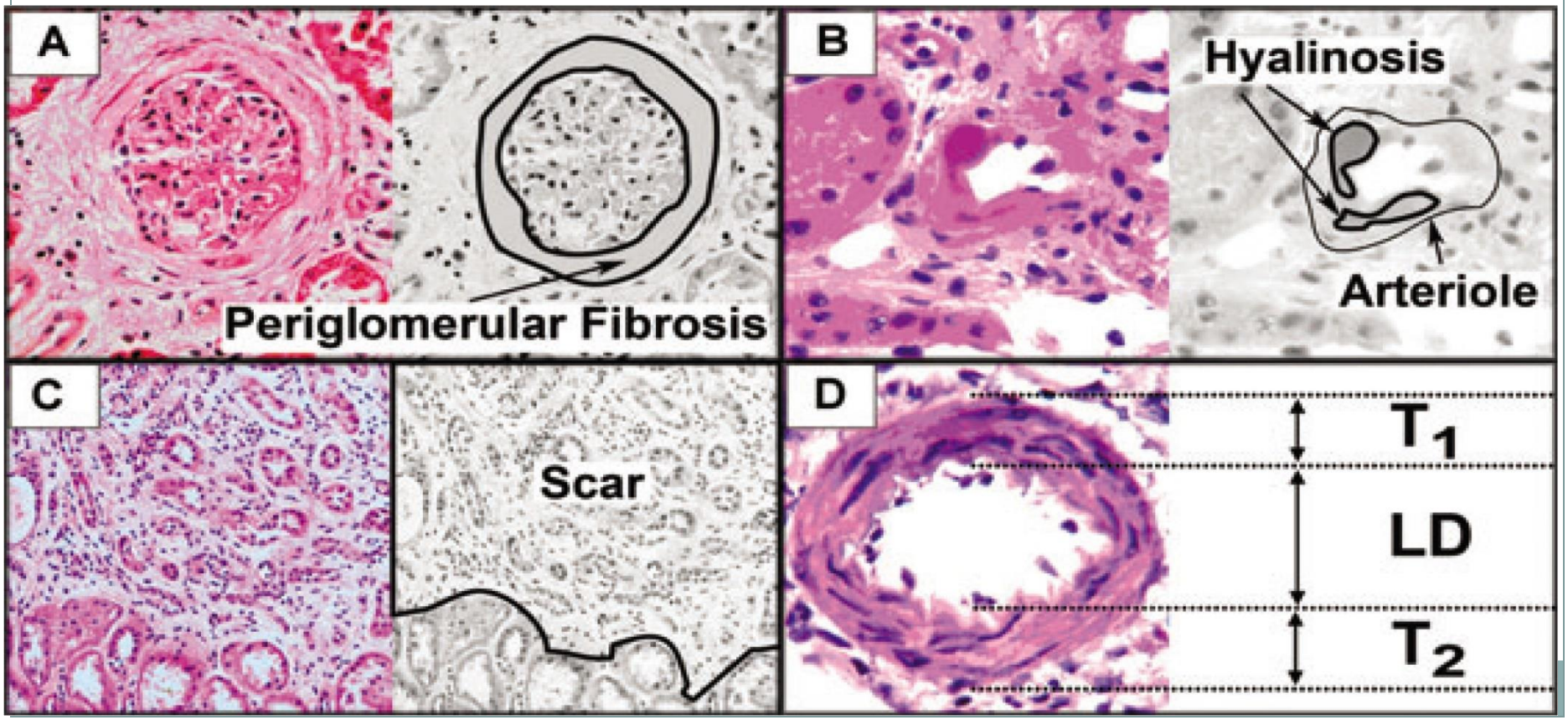
Transplant International

# Remuzzi et al scoring system



# The Maryland Aggregate Pathology Index: A Deceased Donor Kidney Biopsy Scoring System for Predicting Graft Failure

Pathologic features used in MAPI as seen on frozen section preparations. (A) **Periglomerular fibrosis**, (B**) arteriolar hyalinosis**, (C) **scar** including features of interstitial fibrosis, tubular atrophy and glomerulosclerosis, and (D) measurements for **arterial wall-to-lumen ratio** (WLR) calculation, including the thickness of two opposing walls ($T_1$ and $T_2$) and the luminal diameter (LD). WLR=$(T_1+T_2)/LD$

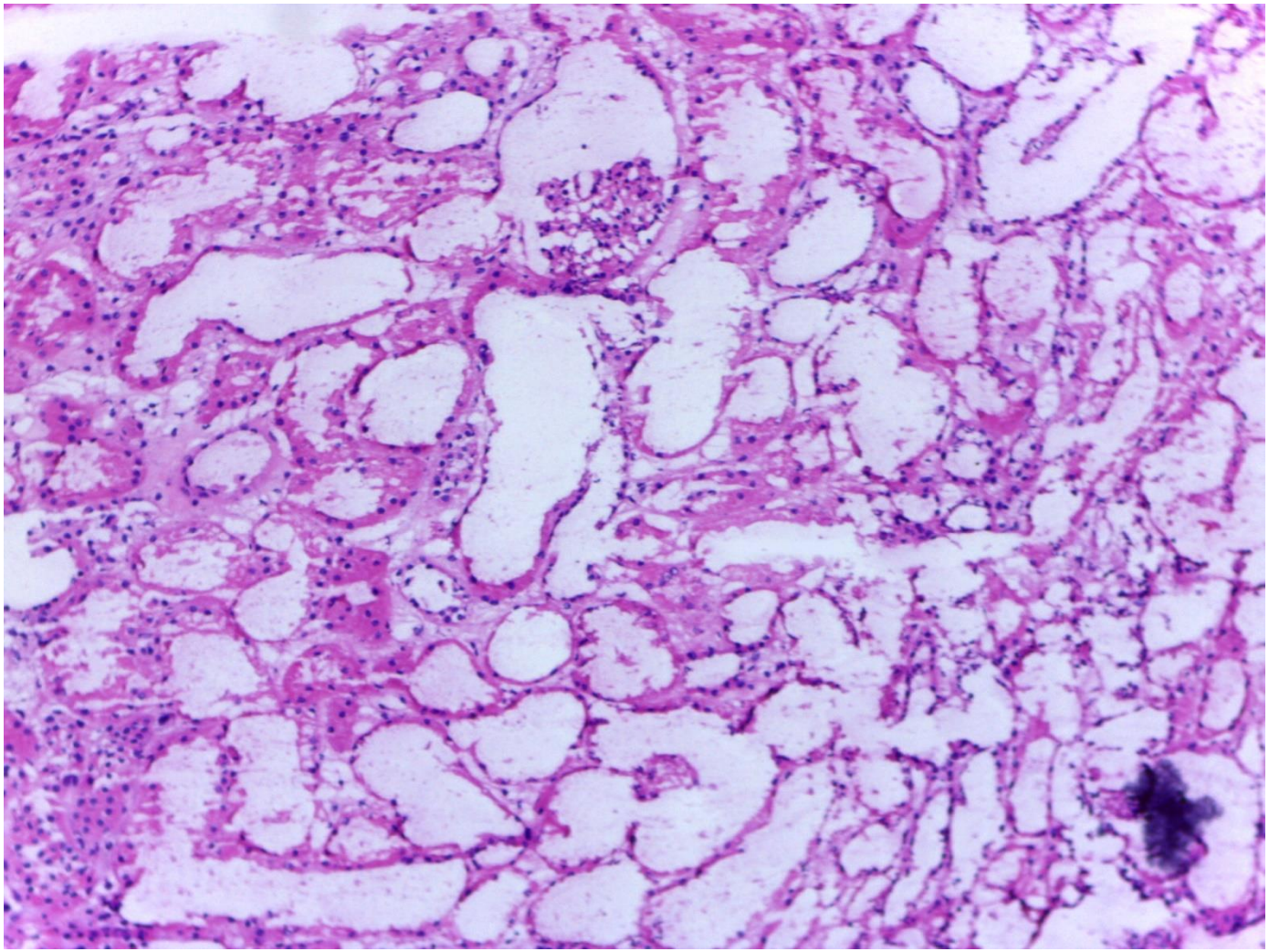


# OUR EXPERIENCE

- 20 preimplantation biopsies done out of 66 cadaver transplants done.
- 4 donor kidneys rejected : 1 had extensive intra glomerular thrombi ,1 case of glomerular cystic disease and 2 cases of increased IFTA.
- Preimplantation biopsy helped procuring the organ which would have otherwise been rejected and is an important tool for expanding donor pool.

# CASE 1

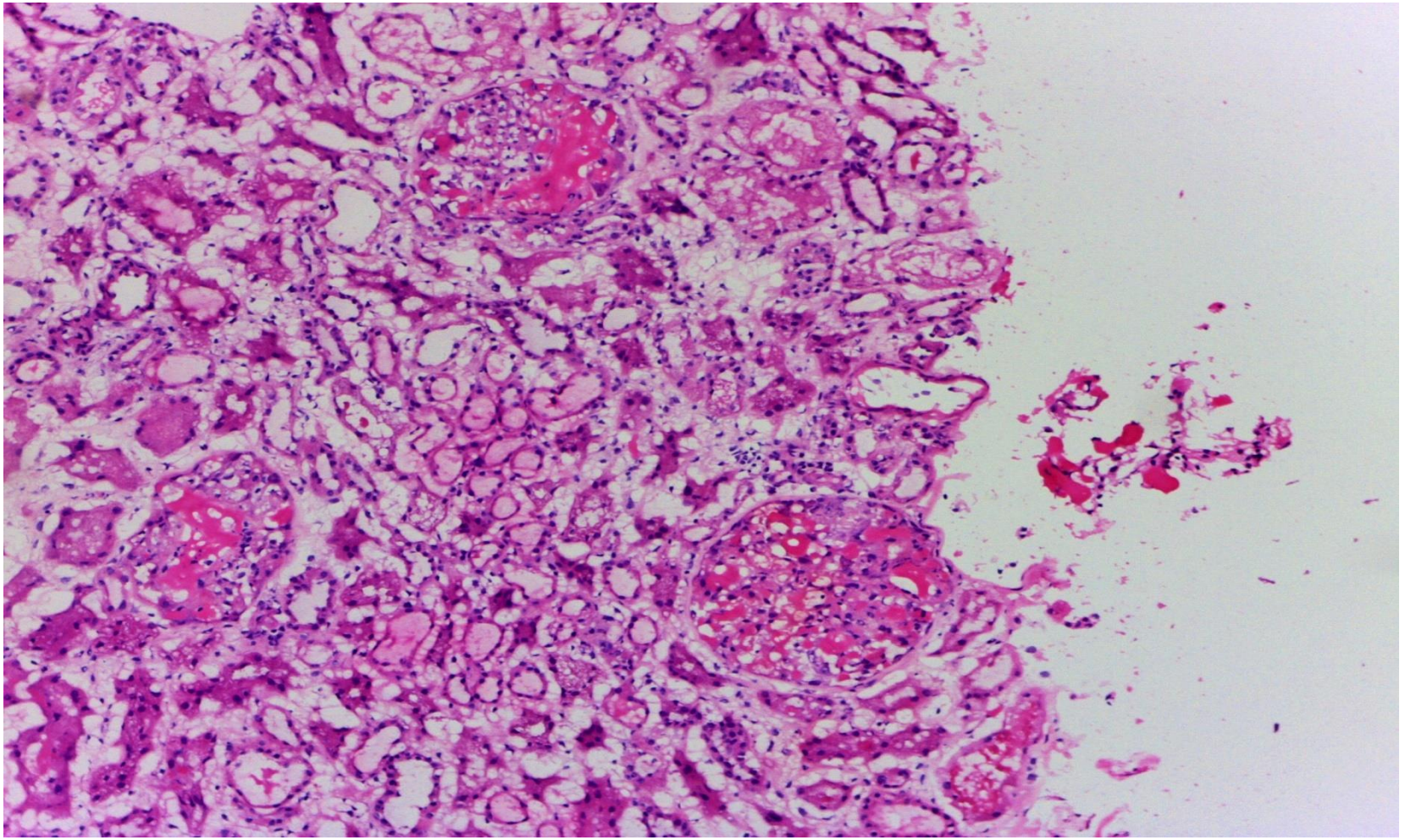
- 18 year old deceased donor with no comorbidities and death due to road traffic accident.
- His creatinine - 1.4 mg/dl and all other biochemical parameters were within normal limits.
- His urine routine showed protein 1+ and no RBCs. He had no history of hypertension or renal disease in family. He was declared brain dead after 48 hours of admission.
- On initial outlook he seemed to be a fair donor who is young with no comorbidities and well managed by ICU team.
- Since he had a baseline high creatinine for his age [Egfr -66 ml per min per 1.73 m2] we decided to do preimplantation biopsy.
- His biopsy showed glomerulocystic changes in all visualised glomeruli and therefore the kidney was discarded.
- Biopsy helped us  from not transplanting a suboptimal kidney.



**Case 1 -Glomerular cystic changes on preimplantation biopsy**

# Case 2

- 46/year old female deceased donor with history of hypertension and death due to road traffic accident.
- Her terminal creatinine was 1.2 mg /dl. Her urine report showed protein 2+ and few RBCs.
- Her preimplantation biopsy showed extensive intra glomerular thrombi.



**Preimplantation biopsy showing extensive intra glomerular thrombi**

# Case 2 continued

- Intra glomerular thrombus is commonly seen in preimplantation biopsies.
- If present in majority of glomeruli, kidney is discarded because it causes delayed graft function and raises the possibility of glomerular disease of unknown etiology in the donor.
- Recently many papers were published on implanted kidneys with intraglomerular thrombi and follow up protocol biopsies showing resolution of thrombi early in post-transplant period and minimal residual changes in some, at the end of one year with good graft function.

# Case 3

- A male deceased donor aged 49 years, was a known case of diabetes mellitus for 10years with terminal creatinine 1.1 mg/dl and urine showing 1+protein.
- His preimplantation biopsy showed interstitial fibrosis and tubular atrophy involving less than 10% with Remuzzi histological score of 2.
- In view of the above findings, the donor kidney was taken up for transplant and had good graft outcome with post-transplant creatinine of 1.2 mg/dl.

# Case 3 continued

- Comorbidities like diabetes and hypertension with urinary abnormalities usually put the transplant team in dilemma whether to take or discard the marginal kidney.
- Long standing history of diabetes mellitus in deceased donor with proteinuria is out rightly rejected on clinical criteria.

- Case 3 patient had long standing diabetes mellitus but it did not translate to histological injury and hence donor kidney was selected.