The Renal transplantation is now widely considered the treatment of choice for patients with ESRD due to improved short- and long-term survival benefits over dialysis treatment.
Recipient surgical aspects

- The standard extraperitoneal pelvic operation was developed by the French surgeons in the 50s of the previous century.
- It was often called “the Kuss procedure in Europe.”
- Since, this procedure has been performed hundreds of thousands of times.

(Starzl, World J. Surg. 24, 759-82, 2000)
Urolithiasis & kidney transplantation

I- Donor Aspects
II- Recipient aspects
III- Bladder calculi
IV- Mansoura experience
Urolithiasis & kidney transplantation

I- Donor Aspects

Ia- Donor candidates with stones

Ib- Management of grafts with stones

Ic- Outcome of graft with stones

Id- Outcome of donors

Rationale:
- 10-15% general population in their life time
- Organ shortage (extended criteria)
- Widespread use of CT
- Small gravels 1-3 mm are of an uncertain prognostic significance
Urolithiasis & kidney transplantation

I- Donor Aspects

Ia- Donor candidates with stones

Evaluation:

- All donor candidates should have a detailed personal history about any prior kidney stones and family history review for any first degree relatives with kidney stones

- All donor candidates should had renal imaging (CT) to assess renal anatomy prior to donation. Any imaging should be examined for the presence of stones

- All donor candidates with history or evidence of kidney stones, the cause should be determined whenever possible
Donor selection:
- A decision to proceed with donation in a candidate with history or current kidney stone should be based on a risk assessment of recurrence
- When proceeding with donor nephrectomy in someone with a current unilateral stone we suggest the kidney with the stone to be removed
Urolithiasis & kidney transplantation

I- Donor Aspects

Ia- Donor candidates with stones

Criteria for accepting Stone Bearing-Kidneys for Transplantation
- Asymptomatic potential donor
- With OR (with history) of a single stone
- No stone-associated metabolic syndrome or urinary tract infection
- The stone should be less than 1.5 cm and potentially removable

(Delmonico et al., 2005)

Criteria for rejecting Stone Bearing-Kidneys for Transplantation
- Stones with high rec rate...cysteine, struvite stones OR those with inherited or systemic disorders as primary or enteric hyperoxaluria
- The donor does not have multiple stones or nephrocalcinosis on CT scan.
- Stones recurrence under appropriate treatment.
- Bilateral renal stones

(Delmonico et al., 2005)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ia- Donor candidates with stones

Counselling:
- All donors or donors candidates who develop kidney stones should receive evidence-based treatments to reduce their risk of stone recurrence
- Low-strength evidence that increased fluid intake (urine output more 2 to 2.5 L) & reduction of soft drink consumption ↓ stone recurrence
- Moderate-strength evidence that thiazide, citrates and allopurinol ↓ stone recurrence

( Fink et al., 2013)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ib- Management of grafts with stones

A- Potential donor side:  
1- Spontaneous passage
2- pre-transplant RIRS
3- SWL

B- Intraoperative:  
1- Ex-vivo ureteroscopic stone extraction
2- Ex-vivo pyelolithotomy
3- Stone removal after revascularization

C- Tx with the stones

( Olsburgh et al., 2013)
**Urolithiasis & kidney transplantation**

I- Donor Aspects

Ib- Management of grafts with stones

A- Donor side: 2- Pre-transplant RIRS
   - In the donor side
   - Few weeks prior to tx
   - Safe procedure by expert endourologist

(Vasdev et al., 2011 ; Ganple et al., 2013)

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**Urolithiasis & kidney transplantation**

I- Donor Aspects

Ib- Management of grafts with stones

A- Donor side: 3- SWL
   - In the donor side
   - Few weeks prior to tx
   - Spontaneous passage of the graveles

(Vasdev et al., 2011 ; Ganple et al., 2013)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ib- Management of grafts with stones

B- Intraoperative: 1- Ex-vivo ureteroscopic stone extraction

- Kidney embedded in ice sluch
- Ureteral spatulation – Pyelotomy
- Semi-rigid or flexible
- Laser, Auxiliary measures

(Martin et al., 2007; Rashid et al., 2004)

Urolithiasis & kidney transplantation

I- Donor Aspects

Ib- Management of grafts with stones

B- Intraoperative: 1- Ex-vivo ureteroscopic stone extraction

- Advantage: No constriction
  - Free mobility of ureter
  - Rigid URS can reach the lower calyx
  - No long training curve (2nd case)

- Disadvantage: Ischemia time
  - Possible injury

(Treveidi et al., 2007; Pushkar et al., 2015)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ib- Management of grafts with stones

B- Intraoperative: 2- Ex-vivo pyelolithotomy

LD OR Deceased
Partial staghorn stone
Nephroscope through pyelotomy

(Janczak et al., 2015; Ganupale et al., 2013; Gao et al., 2015)

Urolithiasis & kidney transplantation

I- Donor Aspects

Ib- Management of grafts with stones

B- Intraoperative: 3- Stone removal after revascularization

Rarely addressed
Flexible after revascularization

(Vasdev et al., 2011)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ia- Donor candidates with stones

Ib- Management of grafts with stones

Ic- Outcome of graft with stones

Id- Outcome of donors

Elective or failed stone retrieval
60-90% clearance rate
stable
Up to 4 years follow up

(Kim et al., 2012; Martin et al., 2007; Wong et al., 2013; Olsburgh et al., 2013)
Urolithiasis & kidney transplantation

I- Donor Aspects

Ic- Outcome of graft with stones

Stone free
No diff. in graft survival
Up to 5 years follow up

(Vasdev et al., 2011; Schade et al., 2011; Pushkar et al., 2015; Rizkalla et al., 2013)
Urolithiasis & kidney transplantation

I- Donor Aspects

Id- Outcome of donors

14 donors .......... Stone free for 2 years
41 donors .......... 1 stone event 1 year follow up

(Pushkar et al., 2015; Rizkalla et al., 2013)

Urolithiasis & kidney transplantation

I- Donor Aspects

Id- Outcome of donors

Normal donor population
7-15% Stone events
10 year follow up
Comparable to normal population in stone events and intervention

(El-agroudy et al., 2007; Azar et al., 2007; Thomas et al., 2013)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIa- Incidence & pathogenesis

- Donor-gifted Vs Denovo
  - 0.4 -4.4 %
  - 47% are ca oxalate

(Hyams et al., 2012; Ji et al., 2013)

Urolithiasis & kidney transplantation

II- Recipient aspects

IIa- Incidence & pathogenesis

hyperparathyroidism
hyper calcimia
hyperuriciemia
hypercalciuria
hypocitraturia
Obstruction and UT Infections

(Mamerellis et al., 2014; Oliveira et al., 2011)
Urolithiasis & kidney transplantation

II- Recipient aspects
IIa- Incidence & pathogenesis

Ca Oxalate stones
- Steroids-induced hypercalciuria
- Cyclosporine-induced bone loss
- Tertiary hyperparathyroidism
- Hyperoxaluria & Metabolic acidosis

*(Fegan et al., 1992; Menon et al., 1992)*

Urolithiasis & kidney transplantation

II- Recipient aspects
IIa- Incidence & pathogenesis

Ca Phosphate stones
- Alkaline pH secondary to RTA
- Hyperparathyroidism

*(Rhee et al., 1999; Dumoulin et al., 1997)*
Urolithiasis & kidney transplantation

II- Recipient aspects
IIa- Incidence & pathogenesis
Urate stones
- Cyclosporine-induced hyperurecemia
- Purine-rich diet

(Norlen et al., 1995; Glicklich et al., 1988)

IIb- Management
Clinical
- Denervated .......no renal colic.
- Urinary tract infection, hematuria, impaired renal function, or obstructive anuria (20%)
- DD with rejection & ATN

(Grief et al., 1990; Heron et al., 1995; Yuan et al., 2015)
II- Recipient aspects

IIb- Management

Imaging

As traditional tools.
US, KUB, CT, and CTU.

(Rajiah et al., 2006; Sciascia et al., 2002)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Management

Survillance

- Stones < 4 mm
- With no obstruction
- Close Follow-up
- Spontaneous passage in 60%

(Matinet al., 2007; Yuan et al., 2015)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

Medical treatment

- Anti-hyperuricemic
- Partial staghorn stone
- ± DJ

(Romero-Vargas et al., 2014; Lancina et al., 1997)

Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

SWL

- Non-obstructing calculi < 1.5 cm.
- No adverse events reported
- Occasional drainage (Pcn, DJ)
- No adverse impact on long or short term graft function

Complications: Steinstrasse and transient hematuria

(Ferreira–Cassini et al., 2012; Li et al., 2011, Challacombe et al., 2005
bhadauria et al., 1995)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

SWL

Limitations

abnormal location near pelvic bones lessen shock wave

Difficult localization

Impaired clearance because abnormal ureteral orifice site

Silent ureteral obstruction with fragments

(Rifaioglu et al., 2008, Lu et al., 2002)

Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

Retrograde endoscopy

Technically demanding ......domal & tortous ureter

TIPS..................Suprapubic pressure

70 lens

fix 2 guidewires with semi-rigid URS

During Flexible advancement ......avoid
deflection in the bladder by rigid cystoscopic sheath

(Sevinc et al., 2015, Hyams et al., 2012)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

PNL

First reported in 1982, Fisher et al.

Advantage: Superficial location

No immunosuppression related complications

Problems: Bowel & Vascular injury

Fibrosis difficult dilation

Bleeding (solitary, platelet dysfunction)

High volume center

(Wyatt et al., 2009; Lu et al., 2002; Challacombe et al., 2005)

Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

PNL

Puncture: US (bowel)

CT (Preferred)

fluoroscopic (failed opacification)

Anterior upper calyx - general (epidural)

Flexible – antegrade URS -DJ

outpatient basis – Mini perc & laser

Stone free (80-100%) – bleeding..........fistula

(Mc Alpine et al., 2015; Ji et al., 2013; Mamerellis et al., 2014)
Urolithiasis & kidney transplantation

II- Recipient aspects

IIb- Treatment

Open Surgery
complex stone
stones over stents
failed other methods
associated pathologies as strictures, PUJO
infection, delayed wound healing
intraoperative nephroscope

(Verrier et al., 2012; Rhee et al., 1999; He et al., 2007)

Urolithiasis & kidney transplantation

II- Recipient aspects

IIc- Impact on survival

Limited data in the literature

Not appear to affect graft or patient survivals

Graft survival 12.6 Vs 10.4 in 3000 tx seris (P = NS)

Stone recurrence in 25% over 3 years of follow up

Case report of lost graft after SWL

(Verrier et al., 2012; Romero-Vargas et al., 2014; Mamerallis et al., 2014)
Urolithiasis & kidney transplantation

I- Donor Aspects

II- Recipient aspects

III- Bladder calculi

IV- Mansoura experience

Urolithiasis & kidney transplantation

III- Bladder calculi
- Politano- leadbetter uv reimplantation
- Renal pancreas combined tx
  - alkaline urine
  - dehydration
  - staples or non absorbable sutures
- Cystolithlapaxy, open

(El-mekresh et al., 1999, rhee et al., 1999)
Urolithiasis & kidney transplantation

I- Donor Aspects
II- Recipient aspects
III- Bladder calculi
IV- Mansoura experience

Urolithiasis & kidney transplantation

IV- Mansoura experience

Contemporary Management of Renal Transplant Recipients With De Novo Urolithiasis: A Single Institution Experience and Review of the Literature

Urolithiasis & kidney transplantation

IV- Mansoura experience
- Between 1974 and 2009
- 16 (1.3%) out of 1208 transplant recipients
- 22 stones developed over a median followup of 170 months
  ➢ the mean (SD) diameter was 13.8 (8.5).

➢ In 3 patients, expectant treatment was successful in 2 and in the remaining patient; the stone remained unchanged till the last follow-up
Urolithiasis & kidney transplantation

IV- Mansoura experience
- Percutaneous nephrostomy tube (PCN) was fixed in 3 patients followed by
  - spontaneous passage in one,
  - stone disintegration by shock wave lithotripsy (SWL) in another and
  - antegrade stent fixation in the latest

- Percutaneous nephrolithotomy (PNL) was required in 6 patients including one patient required 3 separate PNL sessions
Urolithiasis & kidney transplantation

IV- Mansoura experience

➢ - In another 3 patients, SWL was successful.
➢ In 7 patients, vesical stones were treated by cystolitholapaxy.
Urolithiasis & kidney transplantation

IV- Mansoura experience

➢- All the patients were stone free after treatment, except for two whose stones were stable and peripheral on the long term follow-up

Take home message I

➢ Donor-gifted lithiasis is no longer a contraindication for transplantation in select cases.

➢ Stones could be managed by SWL and ex-vivo extraction before transplantation.
Take home message II

➢ Incidence of recipients’ nephrolithiasis is quite rare, with available armamentarium for stone retrieval if it becomes complicated and endangering the graft function.

➢ Limited data exists about the effect of urolithiasis on long-term graft function

Perfection is a difficult task…..
Thank you