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Robotic-assisted Sacrocolpopexy (RASC) in a renal transplant patient with Ehlers Danlos Syndrome (EDS); The first case report and literature review of peri-operative considerations

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Hypothesis and Aims of Study

With aging populations and advances of healthcare, patients with complex medical histories are more likely to present to our practices. Similarly, robotic-assisted surgery is gaining momentum with view to improving patient outcomes, including in such patients. Traditionally, post renal-transplant pelvic organ prolapse (POP) has been surgically treated using vaginal approach, likely to avoid potential damage of the transplanted kidney (1). Patients with collagen abnormalities, like Ehlers-Danlos syndrome (EDS) are particularly at risk of developing POP, including recurrence. In cases of recurrent apical prolapse, an abdominal approach may present a more appropriate option, if feasibility and safety could be demonstrated. In 2017, Rouffilange and colleagues, described an uncomplicated laparoscopic sacrocervicopexy in a post renal-transplant patient (2). Here, we present the first robotic-assisted sacrocolpopexy (RASC) in a renal transplant patient with EDS, and review the literature for perioperative considerations.

Study Design, Materials and Methods

This was a retrospective review of patient records. Quality of life was assessed using the Pelvic Floor Impact Questionnaire (PFIQ-7) and clinical examination performed using the Simplified Pelvic Organ Prolapse Quantification (sPOPQ) (3). The patient was followed up at 6 weeks, 6 months and 1 year post-operatively. We also reviewed the literature for risks associated with these cases and how to mitigate them. We summarise them in this presentation (table 1).

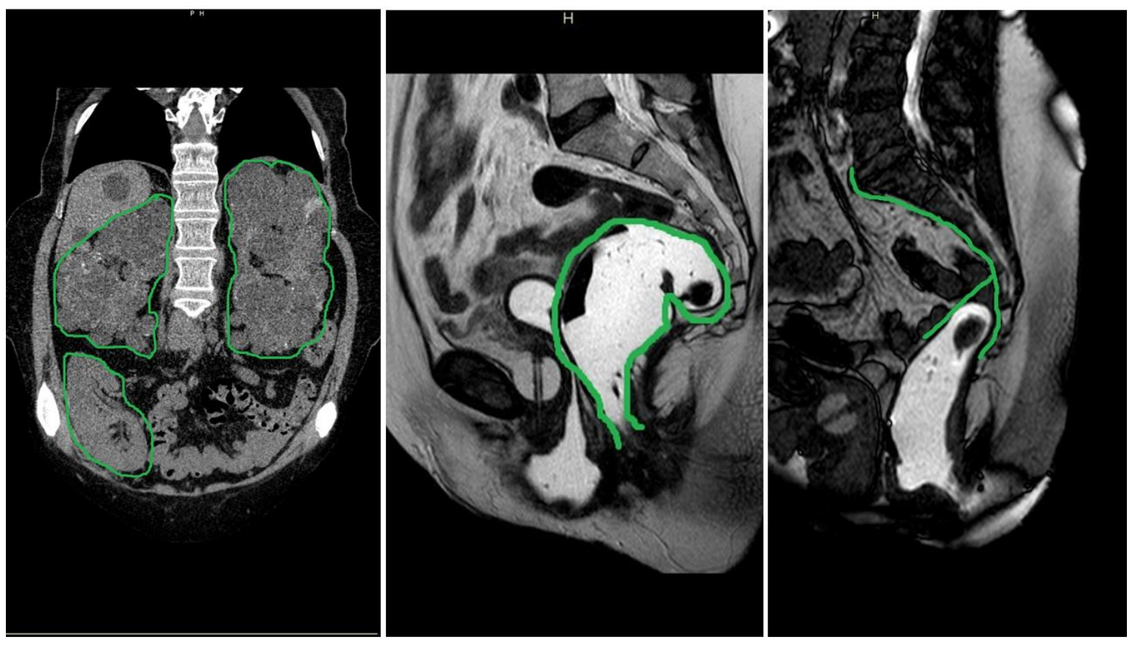

Figure 1: MRI pictures: Left: Pre-operative coronal view (polycystic kidneys and renal allograft highlighted in green. Note also cysts in liver). Middle: Pre-operative sagittal view (prolapse reduced). Right: Post-operative sagittal view (repaired prolapse with mesh attached to sacral promontory).

Interpretation of results

Patients such as ours here, are high risk for perioperative complications, both from the anaesthetic and the surgical perspectives. This is due to both EDS and renal transplant. In addition, safety and feasibility of robotic-assisted surgery in such patients have not been explored.

Management of these patients needs to be conducted via multidisciplinary team and include anaesthetic and renal function assessments pre-operatively.

Laparoscopic assessment can be performed at the beginning of the robotic procedure and should be focused on localisation of the transplanted kidney (in relation to the planned robotic ports) to avoid its injury and assess whether enough peritoneum would be available in the right iliac fossa to re-peritonealise the mesh. Also quantifying intra-peritoneal adhesions (due to previous peritoneal dialysis) in addition to standard pelvic assessments for sacrocolpopexy e.g. level of aortic bifurcation and access to sacral promontory.

Other surgical and anaesthetic precautions are summarised in table 1.

The use of the surgical robot in these cases may also be beneficial due to operating at lower intra-abdominal pressures (compared to laparoscopy), in addition to other benefits e.g. wristed instruments and 3D magnified operative views which are aimed at enhancing surgical safety.

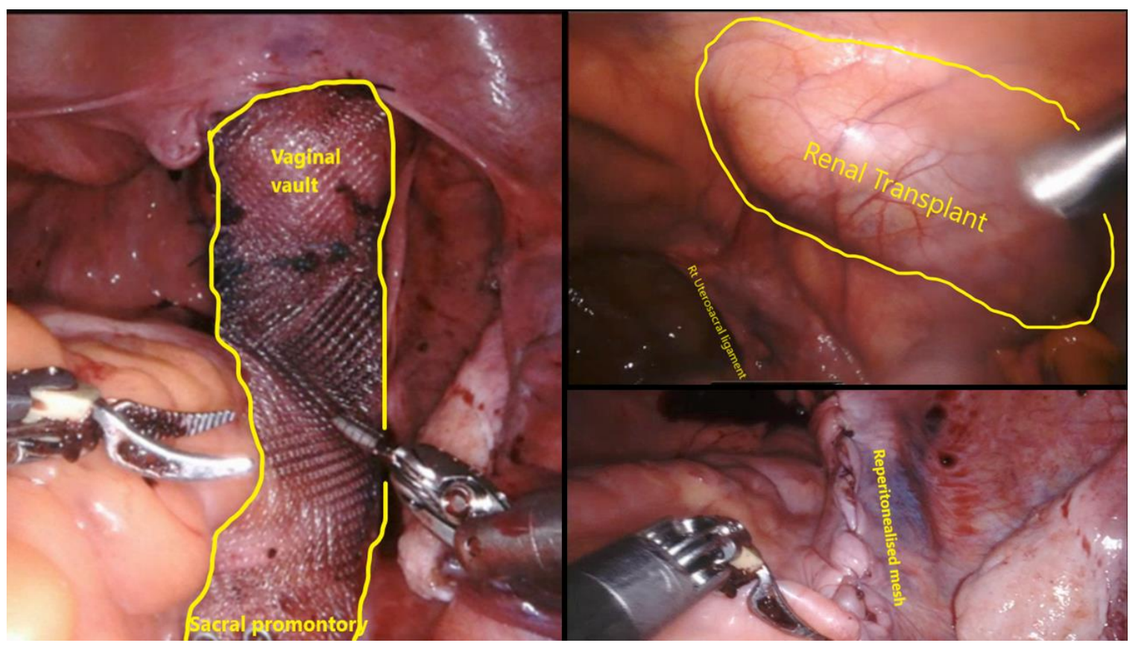

Figure 2: Intra-operative views: Left: mesh between vaginal vault and sacral promontory. Top right: renal transplant extraperitoneally in the right iliac fossa. Bottom right: mesh completely reperitonealised at the end of the procedure.

Ehlers-Danlos Syndrome (EDS)

	Risk*	Mitigation
Preoperative	➢ Patient: assess individual risks (e.g. EDS subtype, results of previous genetic counselling, phynotypic manifestations, previous history of surgery and any associated complications). ➢ Clinicians: Multidisciplinary team familiar with the patient's condition and individual phynotypic manifestations and risks ➢ Institution: facilities appropriate for management of individual patient's risks and potential complications.	
Operative	Difficult airway management (occipito-atlanto-axial, cervical/ TMJ sublaxation/ dislocation, laryngeal haematoma). Pneumothorax, pneumocapcia Bruising, haematoma and skin damage Compartment syndrome Vessel/ bowel rupture Bleeding risk Neurapraixa Dural rupture/ postdural headacke Reduced effectiveness of LA	Pre-operative anaesthetic assessment and operating in an institution with appropriate facilities (e.g. fibreoptic intubation to minimise laryngeal trauma and bleeding risk). Chest USS/ X-ray or needle test as appropriate Careful patient handling, appropriate padding, easily-removable adhesive tapes. Avoid tourniquets and prolonged leg elevation Careful surgical technique Consider DDAVP, Tranexamic acid, autologous blood transfusion, factor VIIa, or platelet transfusion according to individual patient risk. Careful arm/ leg positioning during surgery Careful consideration of whether postoperative epidural analgesia is an appropriate option Anaesthetic review re appropriate alternative options per individual patient
Postoperative	Esophageal rupture POTs Chest infection Reduced muscle function Pain management Poor healing	Careful management of postoperative nausea and vomiting Careful fluid management Chest physiotherapy Early mobilization Adequate pain management (anaesthetic/ pain team). Careful wound surveillance
Long-term	Mesh – unknown Bowel and vascular complications requiring surgery	Surveillance and audit of long-term outcomes. Appropriate mesh peritonealisation and meticulous surgical technique - ? role for adhesion-reducing agents.

Renal Transplant

	Risk**	Mitigation
Preoperative	➢ Patient: assess individual risks (e.g. side of transplant, previous peritoneal dialysis increasing adhesions, current immuosuppressive therapy, graft function). ➢ Clinicians: Multidisciplinary team familiar with the patient's condition and individual risks. ➢ Institution: facilities appropriate for management of individual patient's risks and potential complications.	
Operative	Infection Transplant damage Intraperitoneal organ damage if significant adhesions from previous peritoneal dialysis/ peritonitis. Acute kidney injury	Peri-operative antibiotics – careful choice of suturing material, wound closure, drainage etc. Pre-operative localization of the transplant and any intra-abdominal adhesions (e.g. USS, diagnostic laparoscopy) Planning secondary trocar insertion Vaginal manipulation away from the transplant Surgeon with the appropriate surgical expertise - Careful surgical technique Careful fluid balance
Postoperative	Infection Poor healing Postoperative mortality Acute kidney injury	Peri-operative antibiotic prophylaxis Vigilance re wound infection/ drainage Careful patient surveillance – consider ITU/ HDU setting Careful fluid balance
Long-term	Mesh – unknown	Surveillance and audit of long-term outcomes.

Table 1: Peri-operative risks associated with Ehlers-Danlos Syndrome (EDS) and prior renal transplant. *Individual patient risk depends on EDS subtype, its phynotypic expression, associated medical co-morbidities and previous surgical/ anaesthetic history. **Individual patient risk depends on the function and lack of rejectoin of the renal graft, associated medical co-morbidities and previous surgical/ anaesthetic history. EDS: Ehlers-Danlos Syndrome, USS: Ultrasound scan, LA: local anaesthetic, DDAVP: Deamino-Delta-D Arginine vasopressin (Desmopressin), POTs: Postural orthostatic tachycardia syndrome, ITU: Intensive Therapy Unit, HDU: High Dependency Unit.

Results

Our 51 year old patient presented with obstructed micturition (indwelling catheter in-situ), stage 4 vault prolapse (following previous vaginal hysterectomy, anterior and posterior colporrhaphies), stage 4 cystocele and stage 4 rectocele. There was no urinary incontinence on prolapse reduction and filling the bladder with 300ml of saline. The patient had suffered from adult polycystic kidney disease, renal insufficiency, had had peritoneal dialysis then renal transplantation in the right iliac fossa, and was currently on anti-rejection therapy. She also suffered of severe visual impairment following cerebral haemorrhage and was wheelchair bound. Both shoulder joints were supported by braces to prevent recurrent dislocations. Pre-operative work-up included assessment of renal function, performing dynamic pelvic MRI to exclude asymptomatic rectal intussusception and diagnostic laparoscopy to assess abdomino-pelvic accessibility and aid surgical decision making. Uncomplicated RASC was performed with uneventful recovery. Patient was discharged on day 1 postoperatively after catheter removal and absence of postvoid residual on ultrasound. Six weeks, 6 months and 1 year follow-up demonstrated no POP recurrence or urinary symptoms, with improved quality of life on her PFIQ-7.

Risks associated with EDS, prior renal transplant and how to mitigate them are summarised in table 1.

Conclusions

We demonstrated the feasibility and safety of the first-reported RASC in a renal transplant patient. Our patient also had Ehlers-Danlos Syndrome which increased her peri-operative surgical and anaesthetic risks. Hence, we also reviewed the literature for potential risks and mitigations and summarised them in this presentation.

With the rise of uptake of robotic surgery in Urogynaecology, more evidence is needed in this regard particularly managing complex patients. This is to ensure patient safety and enable appropriate patient counselling for making their informed decision. We call upon specialist societies to utilize surgical databases to support such cause, particularly for rare cases such as the one presented here.

References

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