

LETTER TO EDITOR

Robotic pyeloplasty: Technological global panacea or geo-surgical nightmare?

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To the Editor

Pelvi-ureteric junction obstruction (PUJO) is a well-recognised clinical entity characterised by functionally significant impairment of drainage of urine at the level of the pelvi-ureteric junction due to extrinsic or intrinsic obstruction and is encountered both by adult and paediatric urologists alike. Management of PUJO has been surgical historically, and the gold standard has been an open Anderson-Hynes dismembered pyeloplasty (1). This remains the gold standard with a success rate greater than 90% (2). Minimally invasive surgery to correct PUJO was introduced in 1984 by Arthur Smith using an endopyelotomy technique. Since its introduction the technique has evolved and performed in multiple ways using electricity, laser and cold knife to cut the PUJ. The routine use of endopyelotomy became questionable however due to lower success rates than open pyeloplasty (3). In the United Kingdom and many other affluent nations there has been a paradigm shift in the last 20 years towards minimally invasive techniques and the standard of care now is a *robot-assisted laparoscopic pyeloplasty* (RALP), due to shorter hospital stay, quicker recovery and improved cosmetic results (2). However, robotic surgery is associated with increased costs, often beyond what is affordable for many countries. This poses a challenging question – do the benefits of robotic pyeloplasty outweigh the increased cost? And if so, is it justifiable to deny patients this benefit, purely based on their geographical location?

Moretto *et al.*, recently sought to address this challenge by correlating perioperative and functional outcomes of open and robotic pyeloplasty with their cost effectiveness (2). In their trial 91 patients were included, 48 underwent an open pyeloplasty and 43 a RALP and the authors found similar success rates and operating times but statistically significant lower intraoperative blood loss and early postoperative complication rate and better cosmetic results with RALP. Predictably, the authors found a budget gap between surgical methods related to the cost of the robotic equipment. They found that the total cost of a RALP was € 8.700.90 ± € 1.274.70 and the open pyeloplasty group had a total cost of € 6.327.10 ± € 2.404.40. In parallel, similar trends and outcomes have been demonstrated in the treatment of the paediatric population with pelvi-ureteric junction obstruction.

Table 1 summarises different trials and the costs associated with RALP, laparoscopic and open pyeloplasties (2-5).

Others have taken this exploration further. Mjaess *et al.* ran a cost analysis of robot assisted radical cystectomy in Europe (6). They have found that costs varied significantly across European countries and were mainly attributed to the length of stay and operating time, rather than robotic instrumentation.

Authors	Country	Source	Currency	Cost of RALP	Cost of LP	Cost of OP
Sun (4)	China	Asian J Surg (2022)	€ (CN¥)	7985 ± 364 (61464.75 ± 2800.53)	2880 ± 447 (22169.52 ± 3442.15)	-
Moretto (2)	Italy	J Clin Med (2023)	€	8700.9 ± 1274.7	-	6327.1 ± 2404.4
Casella (5)	USA	J Urol (2013)	€ (\$)	14192 (15337)	14867 (16067)	

Table 1.
Literature summary of cost of RALP, laparoscopic and open pyeloplasty.

They concluded that reducing these might decrease the cost of robot-assisted radical cystectomy and make it more widely accessible. It is plausible that these conclusions can also be translatable to RALP.

Lam *et al.* have analyzed the uptake and accessibility of surgical robots in England and revealed their cost to be exceeding £1 million per unit (7). This financial burden poses challenges for many hospitals, in particular those in less economically affluent countries. Consequently, these hospitals, may be unable to provide robotic procedures to patients, limiting access to the improved outcomes associated with them. Perhaps one solution to aid in solving this discrepancy could be to increase the competition in the market and to centralise further the robotic centres, aiming for economies of scale to make the robot more cost-effective.

It appears that the majority of extant evidence suggests that RALP for PUJO would be mostly advantageous compared to an open pyeloplasty (2). However, given the increased associated costs, it appears likely that the advantages of robotic surgery are not available to all patients, with big discrepancies even inside Europe. Key changes are now needed to reduce the healthcare disparities highlighted here, including, increasing uptake with increasing market competition (such as with the Versius robot, and others) with the hope that it would drive down costs. The *Royal College of Surgeons of England* has a yearly Global Appeal, and in 2023 this aimed to support global access to paediatric surgery, and perhaps as an extension from this, an appeal for access to robotic surgery could follow. Accessible surgical robots will help usher in a new era for patients and surgeons alike in both adult and paediatric urology, and would help us to meet the common goal of delivering the highest quality of surgical care, regardless of global location.

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REFERENCES

1. González ST, Rosito TE, Bujons A, et al. Multicenter comparative study of open, laparoscopic, and robotic pyeloplasty in the pediatric population for the treatment of ureteropelvic junction obstruction (UPJO). *International Braz J Urol (Internet)*. 2022; 48:961-8.
2. Moretto S, Gandi C, Bientinesi R, et al. Robotic versus Open Pyeloplasty: Perioperative and Functional Outcomes. *Journal of Clinical Medicine (Internet)*. 2023; 12:2538.
3. Nadu A, Mottrie A, Geavlete P. Ureteropelvic Junction Obstruction: Which Surgical Approach? *European Urology Open Science* 2009; 8:778-81.
4. Sun L, Zhao D, Shen Y, et al. Laparoscopic versus robot-assisted pyeloplasty in infants and young children. *Asian J Surg*. 2022; 46:868-73.
5. Casella DP, Fox J, Schneck FX, et al. Cost analysis of pediatric Robot-Assisted and laparoscopic pyeloplasty. *J Urol* 2013; 189:1083-6.
6. Mjaess G, Diamand R, Aoun F, et al. Cost-analysis of robot-assisted radical cystectomy in Europe: A cross-country comparison. *Eur J Surg Oncol* 2023; 49:1511-8.
7. Lam K, Clarke J, Purkayastha S, Kinross J. Uptake and accessibility of surgical robotics in England. *Int J Med Robot*. 2021; 17:1-7.

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