Chirurgie robot-assistée chez l'enfant

… pour la neuro-urologie

Pr Alice FAURE

CHU Timone Enfants – APHM

Service de chirurgie pédiatrique

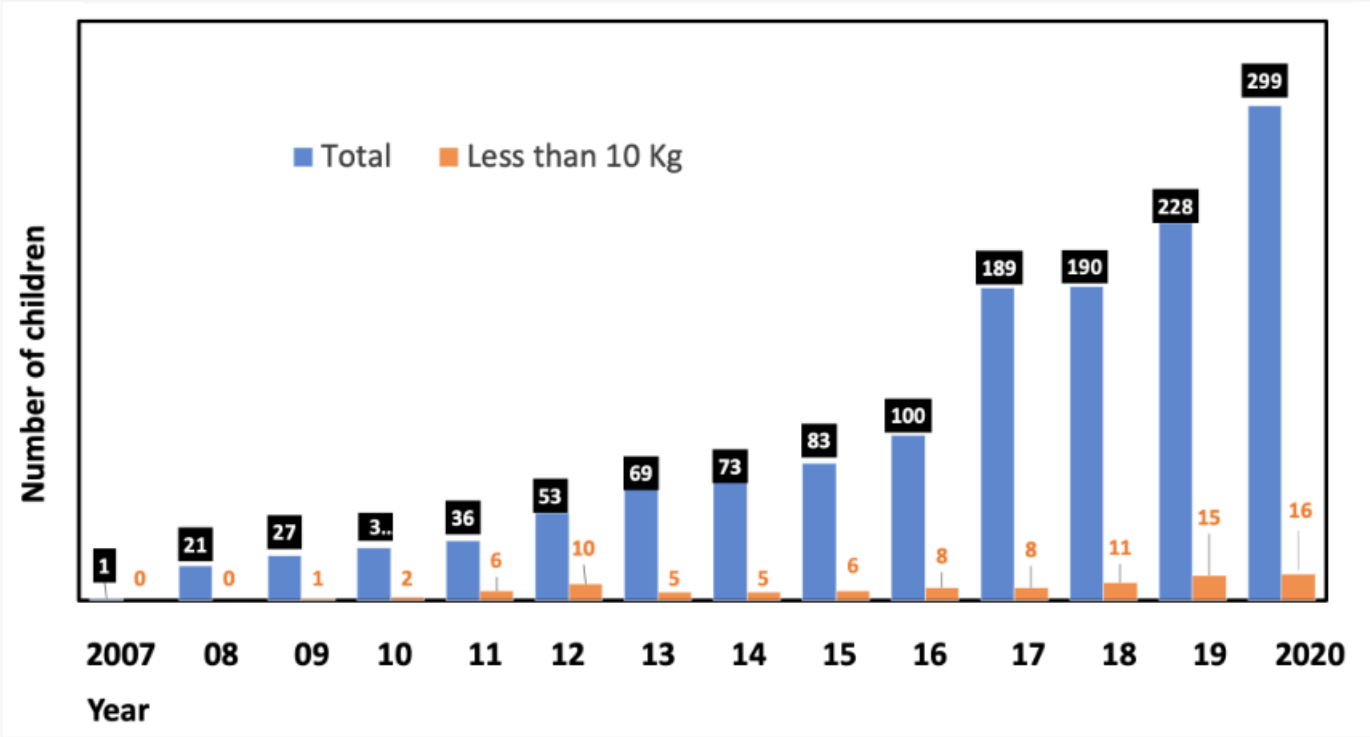
Centre constitutif C-MAVEM

GENULF, 16/12/23

Chirurgie robot-assistée chez l'enfant : état des lieux

11 centres français
1401 enfants
2007-2020
Age médian: 7,9 ans
Poids médian: 24 Kg

6.6% moins de 10Kg



Ballouhey *et al.*, *Surg endos.* (en cours de publication)

Chirurgie robot-assistée chez l'enfant : état des lieux

Bloc pédiatrique
(n=3)

Bloc adulte

Respirateur non adapté
Salle de réveil adulte
Transfert d'équipe

Transfert médicalisé en post-opératoire

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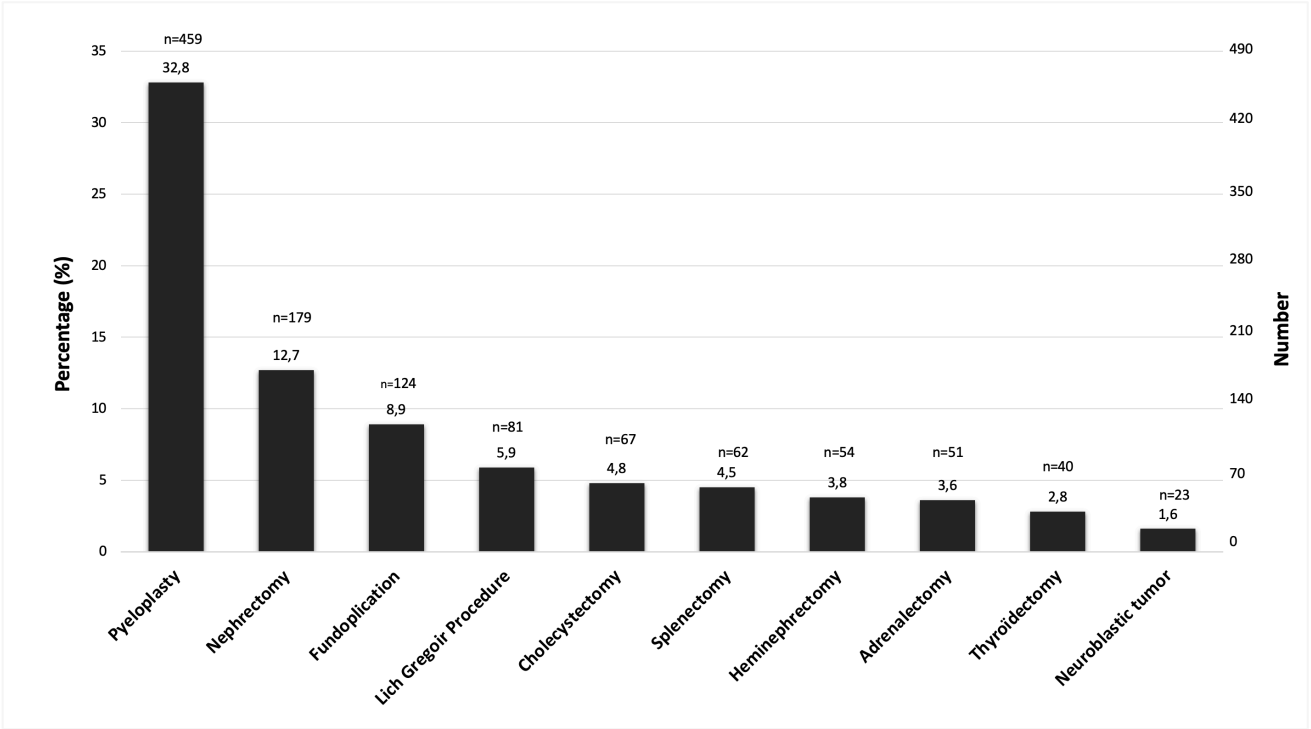

Nb médian de procédure/centre/mois : 1.4 (1.2-1.8)

Ballouhey *et al.*, *Surg endos.* (en cours de publication)

Robotic-assisted laparoscopy surgery (RALS) in children weighing 10kg or less: results of a multicentric study

Topic Paediatric + Adolescent Urology
Clinical step Treatment
Management tool Surgical Robotic

EAU24 PARIS, FRANCE 5-8 April 2024

Presentation mode
Poster

Author list
Faure A.[1], BALLOUHEY Q.[2], Gastaldi P.[1], Botto N.[3], Rod J.[4], Arnaud A.[5], Abbo O.[6], Blanc T.[3]

Étude prospective, multicentrique, observationnelle
2010-2023
57 enfants ≤ 10 Kg : 27 ♂ et 30 ♀

- Age : 13 mois (3-31)
- Poids : 9 kg (4-10)
- DMS : 3 jours (1-3)
- Tps de console : 175 min (51-302)

Pyeloplasty for ureteropelvic junction obstruction (UPJO)	22 (38.5%)
Transperitoneal approach	19
Retroperitoneal approach	3
Total and partial nephrectomy for renal malignant tumors	3 (5.2%)
Nephrectomy for non-functioning kidney	2 (3.5%)
Heminephrectomy for duplex system	9 (15.7%)
Adrenalectomy for neuroblastoma	9 (15.7%)
Uretero-ureteral anastomosis	4 (7%)
Ureteral reimplantation (Lich Gregoire technique)	6 (10.5%)
Bladder diverticulectomy	1 (1.7%)
Urogenital sinus repair	1 (1.7%)

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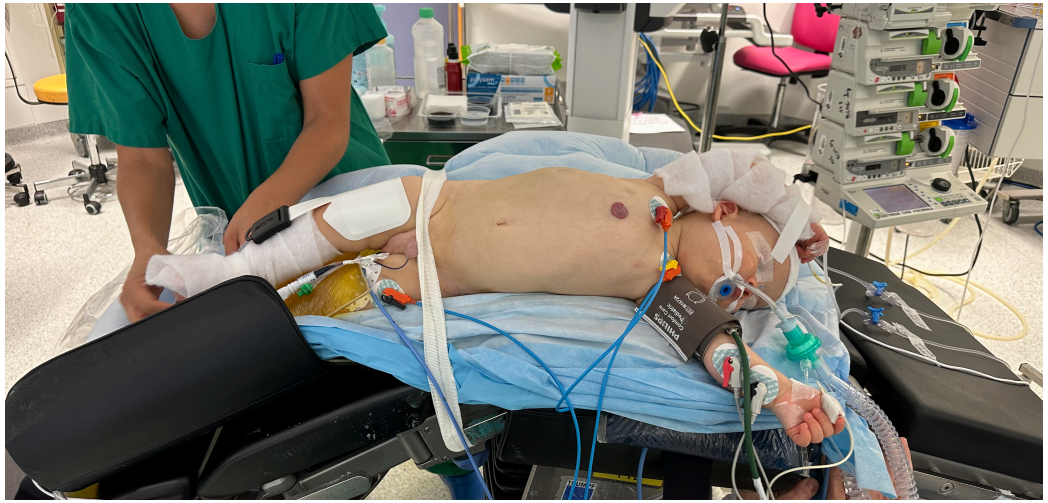
1 conversion (Wilms)

Complications (30-d): 8 (14%)
- 4 (7%) UTI
- 2 (3.5%) JJ non en place
- 2 (3.5%) RAU

} CD II (15.7%)

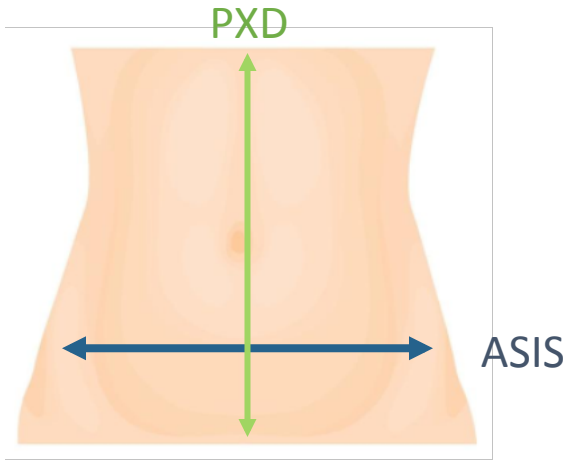
Complications (30-90-d):
- 1 UTI
- 1 récidive hydrocolpos (SUG, atrésie vaginale IIIB) → CD IIIb (1.7%)



Journal of Pediatric Urology (2015) 11, 170.e1–170.e4

How to decide which infant can have robotic surgery? Just do the math

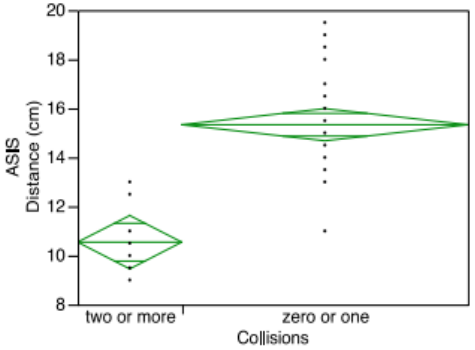
J.B. Finkelstein, A.C. Levy, M.V. Silva, L. Murray, C. Delaney, P. Casale

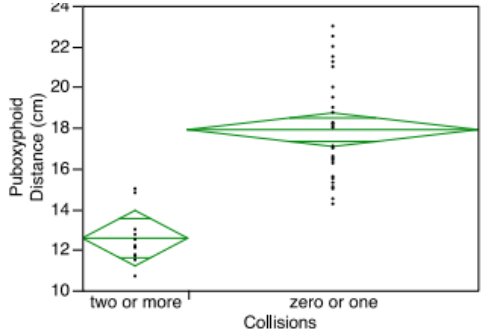


Risque de collision des instruments

- ASIS ≤ 13 cm
- PXD ≤ 15 cm

45 enfants
Age médian: 6.6 mois (3-12)
Poids : 7.9 Kg
Nb moyen de collisions : 1 (0-11)





Pas de corrélation entre ASIS, PXD, nb de collisions ou console time quand on stratifie le poids

Corrélation ASIS et nb de collisions (r= -0.775, p< 0.001)

Corrélation PXD et nb de collisions (r= -0.746, p< 0.001)

Finkelstein JB *et al.*, *J Pediatr Urol.* (2015)

Journal of Pediatric Urology (2015) 11, 170.e1–170.e4

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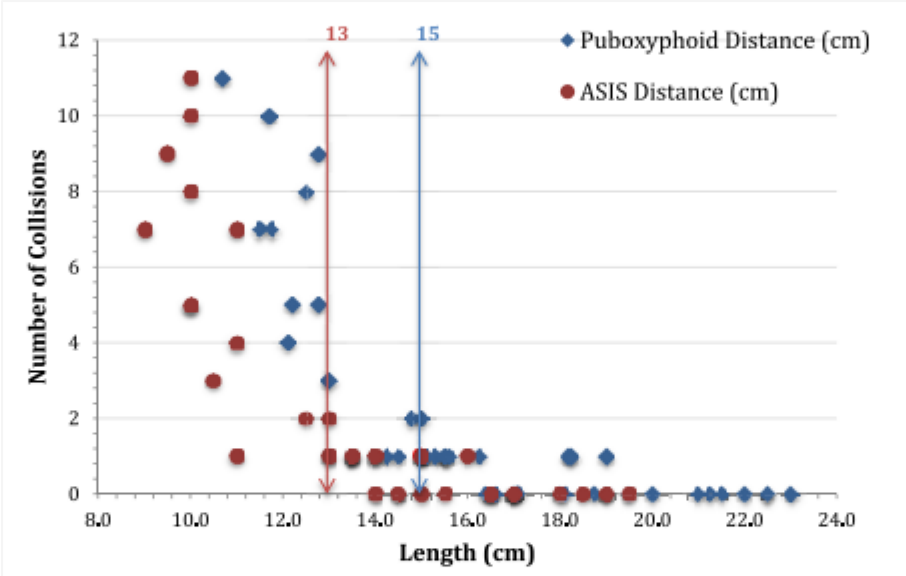


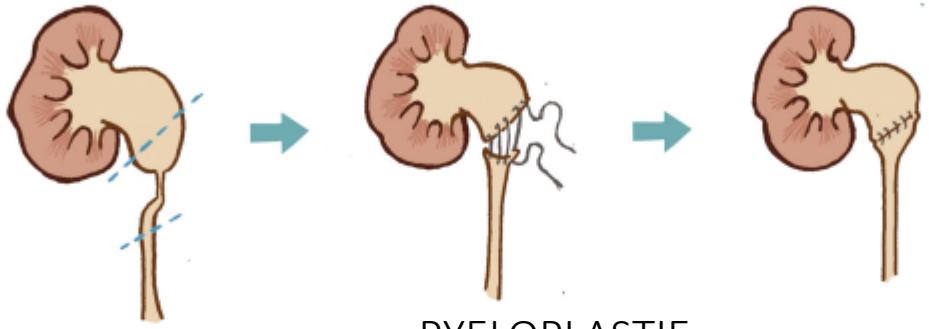
Attention au 1cm de différence !

Placement et localisation des trocarts robot est critique

Finkelstein JB *et al.*, *J Pediatr Urol.* (2015)

Placement de trocart chez petit l'enfant : trucs et astuces

Pyéloplastie robot-assistée



PYELOPLASTIE

Enfants < 7 Kg

Chirurgie ouverte
lombotomie latérale ou postérieure

Enfants > 7 Kg

Chirurgie mini-invasive
laparoscopie ou robot-assistée

Complications spécifiques à l'approche robotique ?

Pediatr Surg Int. 2019 Mar;35(3):391-396. doi: 10.1007/s00383-019-04435-y. Epub 2019 Jan 14.

Pediatric robotic-assisted laparoscopic pyeloplasty (RALP): does weight matter?

Ilan Z Kafka [1], Stanislav Kocherov [2], Jawdat Jaber [2], Boris Chertin [3 4]

Rétrospective monocentrique comparative, 2016-2018
Enfants de moins de 10 kg
Gp 1 : Pyéloplastie open (n=15)
Gp 2 : Pyéloplastie robot (n=15)

- *Mean operative time was 67.8 + 13.4 min in RALP group, while 66.5 + 9.5 min in OP group. (p = 0.76)*
- *Mean hospital stay was 1 day (1-2 days) for RALP and 2 days (2-3 days) for OP*
- *Clavien-Dindo grade I-II complications occurred in one patient from each group.*

Comparative Study > J Urol. 2022 Feb;207(2):432-440. doi: 10.1097/JU.0000000000002232. Epub 2021 Sep 23.

Safety and Efficacy of Robot-Assisted Laparoscopic Pyeloplasty Compared to Open Repair in Infants under 1 Year of Age

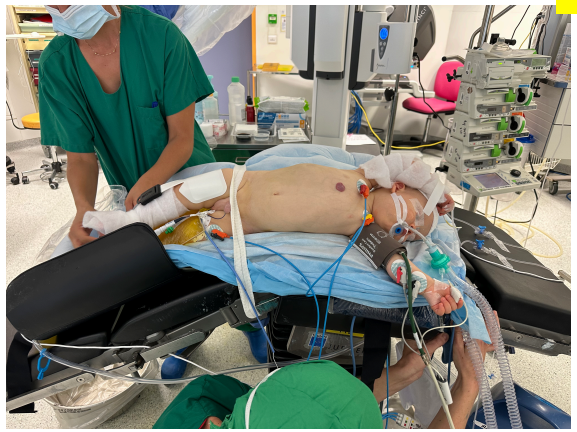
James T Ragué [1], Hans C Arora [1], David I Chu [1 2], Rachel Shannon [1], Ilina Rosoklija [1], Emilie K Johnson [1 2], Edward M Gong [1 2], Bruce W Lindgren [1 2]

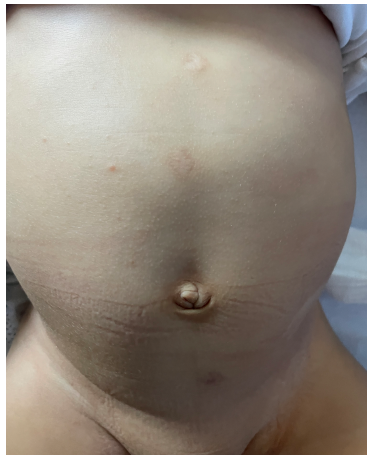
Rétrospective monocentrique comparative, 2009-2020
Enfants de moins de 1 an
Gp 1 : Pyéloplastie open (n=121)
Gp 2 : Pyéloplastie robot (n=83)

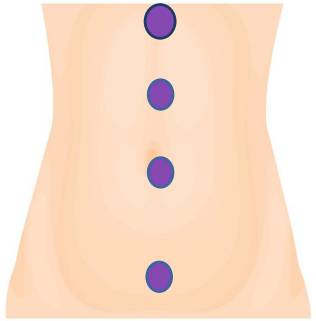
- *In adjusted analysis, the odds of a 30-day complication (OR 0.40, 95% CI 0.08-2.00) was lower for RALP compared to OP, though not statistically significant.*

Pyéloplastie robot-assistée

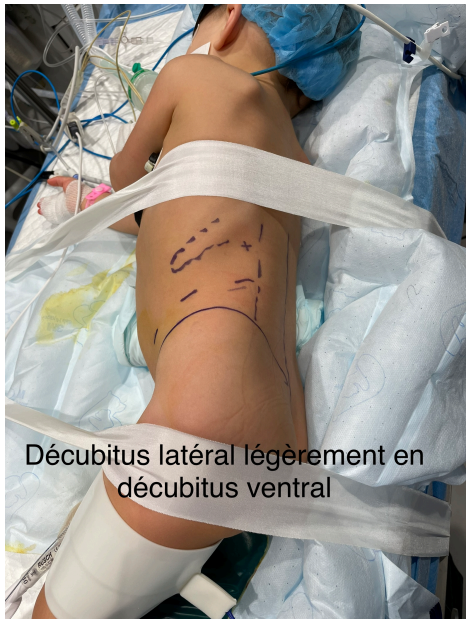
TRANSPÉRITONEALE







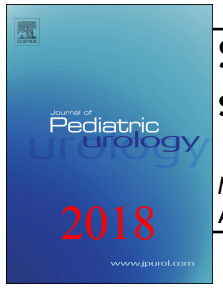
RÉTROPÉRITONEALE



Chirurgie ambulatoire chez les >1 an

Broch A *et al.*, *Eur Urol.* (2023)

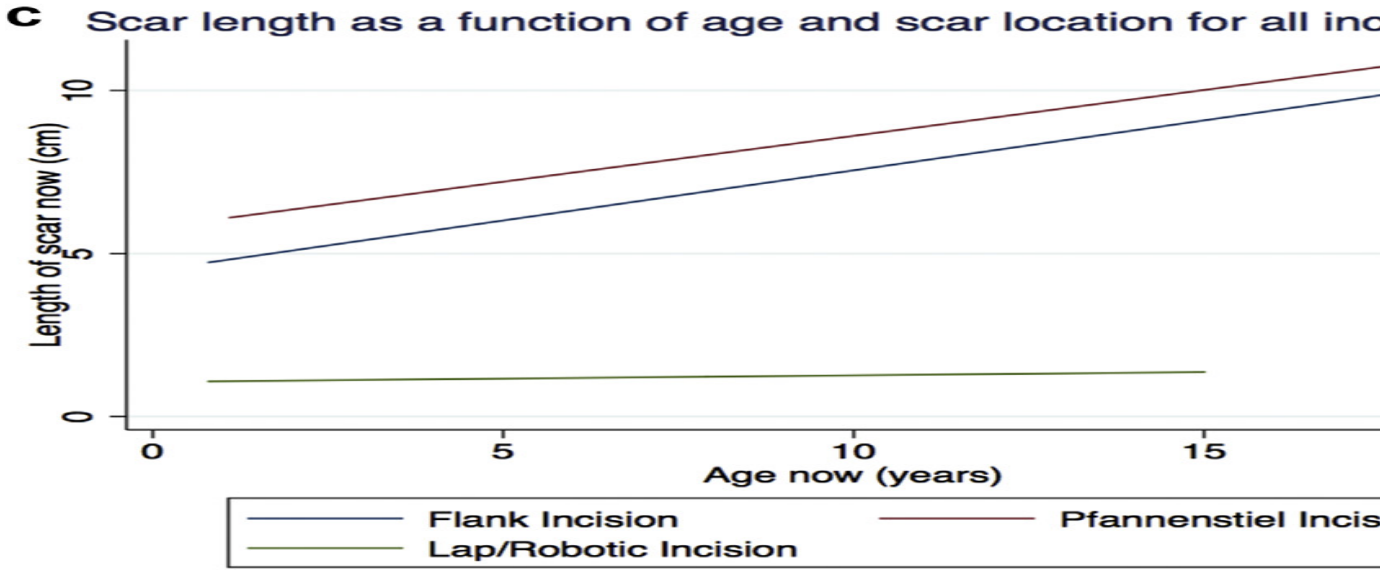
Placement de trocart chez l'enfant



Scar acceptance after pediatric urologic surgery

Mary K. Wang, Yi Li, Rachel E. Selekman, Thomas Gaither, Anne Arnhym, Laurence S. Baskin

- The majority of families are pleased with overall scar appearance after undergoing major pediatric urologic surgery.
- Scars tend to grow in length over- time with less growth noted in Asian children and flank incisions



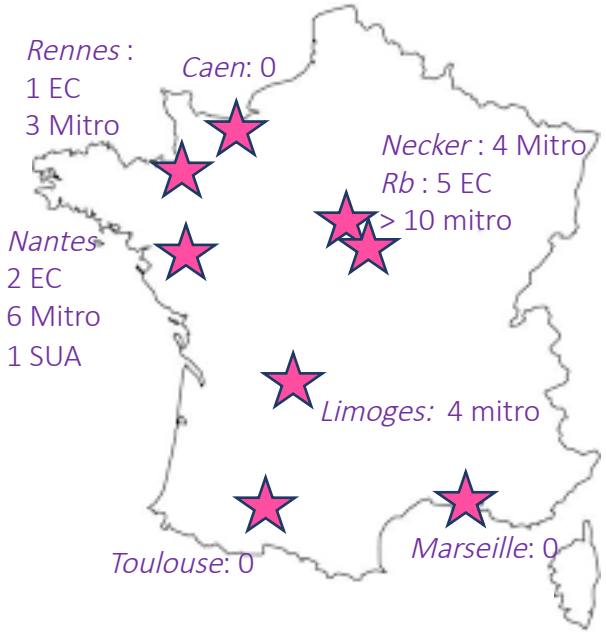
Surg Endosc (2010) 24:1746–1751
DOI 10.1007/s00464-009-0854-z

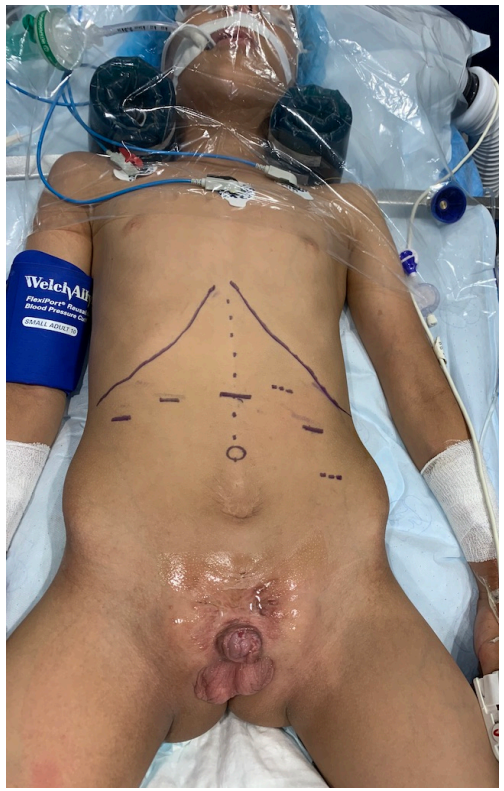
Incisions do not simply sum

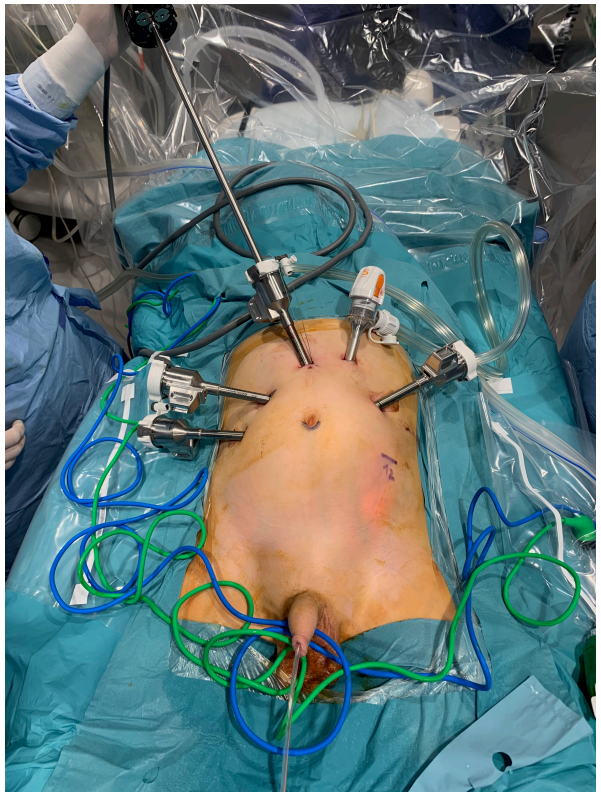
Thane Blinman

Conventional incisions are subject to more total tension than any combination of trocar incisions of equal total length

Expérience française robotique pour la vessie neurolog







Images prêtées , APHP- RB

Mitrofanoff

Robotic-assisted laparoscopic Mitrofanoff appendicovesicostomy (RALMA)

Table 4: Summary of appendicovesicostomy primary outcomes

Author (s)	Year published	Number of patients (total)	Number of robotic patients	Number of open patients	Number of laparoscopic patients	Type of study	Operation time (robotic)	Operation time (open)	Operation time (laparoscopic)
APV									
Pedraza *et al.*	2004	1	1	-	-	Retrospective	6 h	-	-
Storm *et al.*	2007	3	3	-	-	Retrospective	301 min (203–362)	-	-
Nguyen *et al.*	2009	20	10	10	-	Retrospective	323 min (181–507)	267 min	-
Wille and Gundeti	2010	13	11	-	-	Retrospective	347 min	-	-
Famakinwa and Gundeti	2013	18	18	-	-	Retrospective	323 min	-	-
Gundeti *et al.*	2016	88	88	-	-	Retrospective	309 min (±66)	-	-
Grimsby *et al.*	2015	67	39	28	-	Retrospective	-	-	-
Galansky and Gundeti*	2021	69 (includes ACE)	35	34	-	Retrospective	297 min (±62)	253 min (±123)	-
Juul *et al.*	2022	17	5	12	-	Retrospective	249 min (±35)	231 min (±105)	-

Author (s)	LOS (robotic)	LOS (open)	LOS (laparoscopic)	Success rate (robotic) (%)	Success rate (open) (%)	Success rate (laparoscopic)	Postoperative complication rate (robotic) (%)	Postoperative complication rate (open) (%)	Postoperative complication rate (laparoscopic)	Follow-up time
APV										
Pedraza *et al.*	4 days	-	-	100	-	-	0	-	-	10 months
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Nguyen *et al.*	5 days (median)	8 days (median)	-	-	-	-	15	20	-	14.2 months robotic; 18.7 months open (median)
Wille and Gundeti	6 days (median) (3–8)	-	-	-	-	-	55	-	-	20 months (median)
Famakinwa and Gundeti	5.2 days	-	-	94.40	-	-	39	-	-	24.2 months
Gundeti *et al.*	4.5 days (±2.5)	-	-	85.20	-	-	29.50	-	-	29.5 months (median)
Grimsby *et al.*	-	-	-	-	-	-	26	29	-	1239 days open; 724 days robotic (median)
Galansky and Gundeti*	6.8 days (±3.6)	13 days (±12.6)	-	91.20	91.40	-	38.20	42.90	-	75 months (median)
Juul *et al.*	2.6 days (±0.89)	9.3 days (±3.75)	-	80	83	-	40	33	-	12 months

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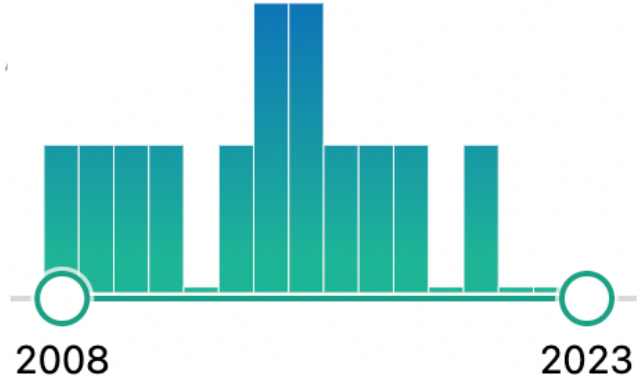
Entérocystoplastie d'agrandissement



BJUI
BJU INTERNATIONAL

Paediatric robotic-assisted laparoscopic augmentation ileocystoplasty and Mitrofanoff appendicovesicostomy (RALIMA): feasibility of and initial experience with the University of Chicago technique

Mohan S. Gundeti, Sujeet S. Acharya, Gregory P. Zagaja and Arieh L. Shalhav
Pediatric Urology, Section of Urology, the University of Chicago Medical Center and Comer Children's Hospital, Chicago, Illinois, USA

2010 BJU INTERNATIONAL | 107, 962–969

Premiers résultats

Durée d'hospitalisation plus courte
Durée d'intervention plus longue
Procédures associées - Reconstruction complexe

Peu de littérature

Courbe apprentissage ++++

Murthy P *et al.*, *Eur Urol.* (2015)

Cohen AJ et al. Urology. (2016)

Robotic-assisted laparoscopic bladder neck reconstruction (RAL

Reconstructio
n du col
v

Table 5: Summary of bladder neck reconstruction primary outcomes

Author (s)	Year published	Number of patients (total)	Number of robotic patients	Number of open patients	Number of laparoscopic patients	Type of study	Operation time (robotic)	Operation time (open)	Operation time (laparoscopic)
BNR									
Bagrodia and Gargollo	2011	4	4	-	-	Retrospective	465 min (356–738)	-	-
Gargollo	2015	38	38	-	-	Retrospective	5.8 h (3.6–12.25)	-	-
Grimsby *et al.*	2016	45	19	26	-	Retrospective	8.2 h (±1.9)	4.5 h (±1.4)	-

Author (s)	LOS (robotic)	LOS (open)	LOS (laparoscopic)	Success rate (robotic) (%)	Success rate (open) (%)	Success rate (laparoscopic)	Postoperative complication rate (robotic) (%)	Postoperative complication rate (open) (%)	Postoperative complication rate (laparoscopic)	Follow-up time
BNR										
Bagrodia and Gargollo	85.7 h (45.0–208.3)	-	-	100	-	-	0	-	-	-
Gargollo	52 h (34–86)	-	-	82	-	-	16	-	-	21 months
Grimsby *et al.*	4 days (median) (2–30)	4 days (median) (1–8)	-	58	44	-	16	12	-	2.8 years

Mean outcomes are shown unless otherwise listed. BNR=Bladder neck reconstruction, LOS=Length of stay

→ Taux de complications à J30 similaire et nb de procédures complémentaires pour incontinence équivalent

Conclusion

- Utilisation de la robotique à de nombreux bénéfices sur les suites postopératoires (esthétique, hospitalisation courte, diminution douleur..)

- Résultats comparables (meilleurs ?) que l'approche traditionnelle open

- Manque de données à long terme et d'études prospectives