

Original Article	
 PST PEDIATRIC SURGERY IN TROPICS www.pediatricsurgeryintropics.com editor@pediatricsurgeryintropics.com	
Pediatric surgery in tropics- Apr-2026	
ISSN 3049-3404 (online)	DOI : https://doi.org/10.70947/PST2026.21
Title	Laparoscopic Activity in Pediatric Surgery Senegal; bicentric study
Authors	Fall M ² , Yonga D ¹ , Mboup M ⁴ , Ndiaye B ⁴ , Seye C ² , Niane M ¹ , Ndour O ² , Ngom G ³ .
Affiliation	1- Service de Chirurgie pédiatrique, Centre Hospitalier Régional de Thiès, Sénégal. 2- Service de chirurgie pédiatrique, hôpital Aristide Le Dantec, Dakar, Sénégal 3- Service de chirurgie pédiatrique, hôpital d'enfants Albert Royer, Dakar, Sénégal 4- Service de chirurgie pédiatrique, hôpital principal, Dakar, Sénégal

Keywords	Abstract
Pediatric	Introduction: Pediatric laparoscopy is a minimally invasive technique offering significant advantages. In Senegal, its adoption is limited by material and training constraints. This bicenter study describes and compares the first pediatric laparoscopic activities of two Senegalese university hospitals. Methods: A prospective descriptive study was conducted over periods of 17 months (Thiès Regional Hospital Center, HRT) and 35 months (Dakar Main Hospital, HPD). All children who underwent laparoscopic surgery were included. The parameters analyzed included epidemiological characteristics, indications, surgical techniques, and peri- and postoperative outcomes. Results: A total of 101 patients were included (51 at HRT, 50 at HPD). Laparoscopic activity accounted for 13.42% of procedures at HRT and 7.59% at HPD. The main indications were appendicitis (45% HRT, 10% HPD), cryptorchidism (22% HRT, 26% HPD), and gallstones (20% HRT, 30% HPD). The “open laparoscopy” approach was used systematically. The conversion rate was low (2.1% at HRT, 2% at HPD), but the rate of intraoperative incidents was higher at HRT (18.7% vs. 4%). Postoperative morbidity was 2% (HRT) and 6% (HPD), with one death at HRT. The average length of hospital stay was 7 days at HRT versus 1.8 days at HPD. Conclusion: This study demonstrates the feasibility and safety of pediatric laparoscopy in Senegal for common indications. It reveals disparities between centers related to recruitment, local expertise, and integration of the activity. Optimizing this practice requires strengthening specialized training, increasing access to appropriate equipment, and better integration into the daily and emergency surgical care of children.
Laparoscopy	
Senegal	
Africa	

INTRODUCTION

Pediatric laparoscopy has become a gold standard minimally invasive surgical technique, offering significant advantages over conventional laparotomy: reduced postoperative pain, shorter hospital stays, and better cosmetic outcomes. However, in resource-limited countries, its adoption remains challenging due to the high costs of equipment, the need for specialized training, and the complexity of managing young patients. In Senegal, two university hospitals established approximately four years ago, the Regional Hospital of Thiès (HRT) and the Principal Hospital of Dakar (HPD); have recently developed laparoscopic activity in pediatric surgery. However, data on their respective experiences, surgical indications, clinical outcomes, and encountered difficulties remain poorly documented. The objective is to provide practical recommendations to optimize laparoscopic care for children in Senegal while highlighting the specific challenges faced by each facility. This pioneering analysis could serve as a model for other African countries facing similar challenges.

PATIENTS AND METHODS

For the Regional Hospital of Thiès (HRT), the study lasted 17 months (June 2023 to October 2024), while for the Principal Hospital of Dakar (HPD), it covered 35 months (November 2020 to October 2023). Both studies were prospective and descriptive, with exhaustive sampling, included all patients who underwent laparoscopic surgery in the two departments during their respective study periods.

RESULTS

1-Frequency:

Laparoscopic activity accounted for 7.59% (50 laparoscopic cases / 658 operated children) at HPD and 13.42% at HRT (51 laparoscopies / 380 operated patients).

2-Age:

The average age at HRT was 9.31 years (range: 6–15 years), with a majority >10 years (57%). At HPD, the average age was 12 years (range: 29 days–15 years), with the majority aged 4–13 years.

3-Sex:

Both series showed a male predominance: 82% boys (sex ratio 4.66) at HRT, including 2 cases of DSD, and 56% boys (sex ratio 1.27) at HPD.

4-Pathologies and Indications:

Appendicular, gallbladder, and testicular pathologies dominated the indications (Table 2).

5-Recruitment Method:

All patients at HRT were operated on a scheduled basis, while 14% of patients at HPD were treated in an emergency context.

6-Surgical Techniques and Outcomes:

All procedures began with an "open celioscopy" approach, which was systematically transumbilical at HRT and supra-, infra-, or transumbilical at HPD. The average duration at HRT was 49.51 minutes (range: 24–113 minutes), and 45 minutes (IQR: 30–60 minutes) at HPD. The incident rate was 18.7% at HRT (including 2.1% conversions) and 4% at HPD (2% conversions).

7-Postoperative Outcomes:

Morbidity was 2% at HRT and 6% at HPD. There were no deaths at HPD, but one death occurred at HRT due to biliary peritonitis from clip failure. The average hospital stay was 7 days (range: 1–13 days) at HRT and 1.8 days (range: 1–5 days) at HPD.

Discussion

The laparoscopic activity rate at HRT and HPD is higher than in previous Senegalese series [1,2,3], similar to some African series [4,5,6,9], but lower than international standards [7,8,10]. Strengthening continuous training and hospital equipment are key areas for improvement. The age of our patients aligns with many African [4,5,6] and Senegalese [1,2,3] studies. However, both series lacked indications for neonatal emergencies such as esophageal atresia and diaphragmatic hernia. Enhanced access to miniaturized equipment will help elevate laparoscopic standards [8,19]. In both centers, "open celioscopy" was systematic to reduce injury risks [12]. The treated pathologies overlap with those in Senegalese and African series [2,3,4,5]. Diversifying indications will require broader adoption of laparoscopy and the establishment of simulation centers for training pediatric surgery students in basic techniques. The difference in postoperative outcomes stems from HRT patients being operated on during periodic 3–5 day missions

involving pediatric surgeons from Dakar, as well as the absence of standardized scoring systems like the Critical View of Safety (CVS) for laparoscopic cholecystectomy [14,15,16,18]. Strengthening local skills at HRT and better integrating laparoscopy into daily surgical activities will improve outcomes [10,17,19].

CONCLUSION

Pediatric laparoscopy, though still limited in sub-Saharan Africa, demonstrates its efficacy and safety for various indications (appendicitis, cryptorchidism, gallbladder lithiasis). Major challenges include access to adapted equipment, specialized training, and integration into emergency care. Senegalese [1,2,3] and African [4,5,6,9] studies underscore the need for institutional support to optimize this practice and reduce disparities with international standards [7,8,10].

REFERENCES

Citation	Copyright	DOI
1. Fall M, Gueye D, Wellé IB, Lo FB, Sagna A, Diop M, et al. Laparoscopic Appendectomy in Children: Preliminary Study in Pediatric Hospital Albert Royer, Dakar. <i>Gastroenterol Res Pract.</i> 2015;2015:1-5.	© 2015 The Authors. Published by Hindawi Limited.	https://doi.org/10.1155/2015/862865
2. Ndoeye ND A, Fall MB, Ndour O, Cissé M, Ngom G, Fall I, et al. La	© 2013 Journal Africain Francophone de Chirurgie Pédiatrique.	Not available

coelioscopie pédiatrique au Sénégal. <i>J Afr Fr Chir Pediatr.</i> 2013;0(4):199-203.		
3. Ndoye JM, Diop PS, Fall M, Fall B. Le traitement coelioscopique de la lithiase vésiculaire chez l'enfant drépanocytaire au Sénégal. <i>J Afr Hepatol Gastroenterol.</i> 2011;5:33-35.	© 2010 Springer-Verlag France.	https://doi.org/10.1007/s12157-010-0234-7
4. Salihou S, Dorcas N, Fopa M, Salihou F, Saliou A, Ngaroua. La Chirurgie Mini Invasive de l'Enfant à l'Hôpital Régional de Maroua : Bilan de Deux Années de Pratique. <i>Health Sci Dis.</i> 2024;25(10):84-86.	© 2024 Health Sciences and Diseases (HSD).	Not available
5. Talabi AO, Adisa AO, Adefehinti O, Sowande OA, Etonyeaku AC, Adejuyigbe O. Early experience with laparoscopic surgery in children in Ile-Ife, Nigeria. <i>Afr J Paediatr Surg.</i> 2015;12(1):29-32.	© 2015 African Journal of Paediatric Surgery. Published by Wolters Kluwer - Medknow.	https://doi.org/10.4103/0189-6725.150973
6. Abdur-Rahman LO, Bamigbola KT, Nasir AA, et al. Pediatric	© 2016 Journal of Clinical Sciences. Published by Wolters Kluwer - Medknow.	https://doi.org/10.4103/2468-6859.192507

laparoscopic surgery in North-Central Nigeria: Achievements and challenges. <i>J Clin Sci.</i> 2016;13:158-162.		
7. Alain JL. La vidéo-chirurgie de l'enfant. <i>Arch Pediatr.</i> 1993;50:637-638.	© 1993 Éditions Scientifiques et Médicales Elsevier SAS.	Not available
8. Pipal DK, Kumar N, Kothari S. Prospective study of laparoscopic surgery in paediatric patients. <i>Int Surg J.</i> 2020;7(2):500-504.	© 2020 International Surgery Journal. Published by Innovative Publications.	https://doi.org/10.18203/2349-2902.isj20200436
9. Sadjo SA, Bob DN, Fopa PM, Salihou F, Saliou B. La Chirurgie Mini Invasive de l'Enfant à l'Hôpital Régional de Maroua: Bilan de Deux Années de Pratique. <i>Health Sci Dis.</i> 2024;25(10):84-86.	© 2024 Health Sciences and Diseases (HSD).	Not available
10. Shi Z. Laparoscopic vs. open surgery: A comparative analysis of wound infection rates and recovery outcomes. <i>Int Wound J.</i> 2024;21(3):e14474.	© 2024 The Author(s). <i>International Wound Journal</i> published by Medicalhelplines.com Inc and John Wiley & Sons Ltd.	https://doi.org/10.1111/iwj.14474
11. Marchand GJ, Masoud A, King A, Brazil G, Ulibarri H,	© 2022 Author(s) (or their employer(s)). Published by BMJ.	https://doi.org/10.1136/bmj-sit-2022-00012

Parise J, et al. Systematic review and meta-analysis of Veress needle entry versus direct trocar entry in gynecologic surgery. <i>BMJ Surg Interv Health Technol.</i> 2022;4:e000121.		
12. Antonopoulou MI, Manatakis DK. Critical View of Safety in Laparoscopic Cholecystectomy: A Word of Caution in Cases of Aberrant Anatomy. <i>Surg J (N Y).</i> 2022;8(3):e157-e161.	© 2022 The Authors. Published by Thieme Medical Publishers, Inc.	https://doi.org/10.1055/s-0042-1758057
13. El Boghdady M, Arang H, Ewalds-Kvist BM. Fundus-first laparoscopic cholecystectomy for complex gallbladders: A systematic review. <i>Health Sci Rev.</i> 2022;2:100014.	© 2022 The Authors. Published by Elsevier Ltd.	https://doi.org/10.1016/j.hsr.2022.100014
14. Madhok B, Nanayakkara K, Mahawar K. Safety considerations in laparoscopic surgery: A narrative review. <i>World J Gastrointest Endosc.</i> 2022;14(1):1-16.	© 2022 The Author(s). Published by Baishideng Publishing Group Inc.	https://doi.org/10.4253/wjge.v14.i1.1

15. Destro F, Pierucci UM, Durante E, Caruso AM, Girgenti V, Canonica CPM, et al. Laparoscopic Cholecystectomy in Children: The Experience of Two Centers Focusing on Indications and Timing in the Era of "New Technologies". <i>Children (Basel)</i>. 2023;10(11):1771.	© 2023 by the authors. Licensee MDPI, Basel, Switzerland.	https://doi.org/10.3390/children10111771
16. Morales AA, Chevarria YG, Mursuli AL, Rodriguez PRL. General Complication of Laparoscopic Surgery, Necessary Review. <i>Gen Surg</i>. 2024;9:3705.	© 2024 Asociación Española de Cirujanos (Spanish Association of Surgeons).	Not available
17. Ndoye MD, Bah MD, Pape IN, Diouf E, Kane O, Beye M, et al. Prise en charge périopératoire de la cholécystectomie par voie laparoscopique chez l'enfant drépanocytaire homozygote. <i>Arch Pediatr</i>. 2008;15(9):1393-1397.	© 2008 Elsevier Masson SAS.	https://doi.org/10.1016/j.arcped.2008.06.0
18. Basunbul LI, Alhazmi LSS,	© 2022 Basunbul et al.	https://doi.org/10.7759/cureus.22246

Almughamisi SA, Aljuaid NM, Rizk H, Moshref R. Recent Technical Developments in the Field of Laparoscopic Surgery: A Literature Review. <i>Cureus</i> . 2022;14(2):e22246.		
19. Cadière G, Leroy J. Principes généraux de la chirurgie laparoscopique. In: <i>Chirurgie Digestive</i> <i>par Voie Coelioscopique</i> . Paris: Elsevier; 1999. p. 1-10.	© 1999 Elsevier Masson SAS.	Not available

Table 1: General Characteristics of the Two Studies

Parameter	HRT (Thiès)	HPD (Dakar)
Study Period	June 2023 – Oct. 2024 (17 months)	Nov. 2020 – Oct. 2023 (35 months)
Number of patients	51	50
Average Age	9.31 years	12 years
Sex Ratio (M/F)	4.66 (82% boys)	1.27 (56% boys)
Study Type	Prospective descriptive	Prospective descriptive

Table 2: Pathologies and Surgical Indications

Pathology	HRT (%)	HPD (%)
Appendicitis/Appendicular Abscess	45%	10% (emergency)
Cryptorchidism/Non-palpable Testicle	22%	26%
Gallbladder Lithiasis	20%	30%
Inguinal Hernia	10%	8%
Variations in Sexual Development	3%	6%

Table 3: Surgical Outcomes and Complications

Parameter	HRT	HPD
Conversion Rate	2.1%	2%
Intraoperative Incidents	18.7%	4%
Postoperative Complications	2%	6%
Mortality	2% (1 case)	0%
Average Hospital Stay	7 days	1.8 days

Address for correspondence	Name: FALL Mbaye Postal Address: BP 22000, Dakar-Ponty, Senegal Email: mbayefall0803@gmail.com Telephone: 00221776114554
Received on 23 rd May 2025	Published on 1 st Apr 2026
Acknowledgment none	Conflicts of interest none
Source of funds none	Ethical clearance obtained
Citation	https://doi.org/10.70947/PST2026.21
Orcid	



