Pacific Journal of Medical Research
https://scienceget.org/index.php/pjmr
Vol. 2, No. 2, 2025
pISSN: 3067-4158 I eISSN: 3067-2147

ARTICLE

DOI: https://doi.org/10.70818/pjmr.2025.v02i02.079

Laparoscopic Surgery of Paediatric Age Group at TMSS Medical College Influenced by Watching Real-Time Surgery in Televu Assisted Technology

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ABSTRACT ***Background:*** Laparoscopic surgery offers substantial advantages in paediatric patients by minimising invasiveness, reducing postoperative pain and accelerating recovery. ***Aim:*** To assess the safety and efficacy of paediatric laparoscopic surgery at TMSS Medical College when influenced by observing real-time procedures via Televu-Assisted Technology. ***Methods:*** We conducted a retrospective analysis of 30 paediatric laparoscopic cases performed between June 2024 and January 2025. All operating surgeons had watched relevant procedures in real time via Televu within six months prior to each operation. Patient demographics, procedure types, operative times, length of hospital stay, and postoperative complications were recorded. ***Results:*** Thirty consecutive paediatric patients (16 males, 14 females; age range 3–12 years) underwent laparoscopic surgery without conversion to open technique. Procedures included appendicectomies (n = 12, 40 %), hernia repairs (n = 8, 26.7 %), orchiopexies (n = 6, 20 %) and cholecystectomies (n = 4, 13.3 %). Four patients (13.3 %) experienced minor complications: two with minor bleeding (6.7 %), one with minor bowel injury (3.3 %) and one with superficial wound infection (3.3 %). Prolonged operative time (> 60 minutes) was independently associated with an increased risk of complications (adjusted OR 3.12; 95 % CI: 1.28–7.65; p = 0.015). ***Conclusion:*** Paediatric laparoscopic surgery at TMSS Medical College, influenced by observing live Televu feeds, proved safe and effective despite the absence of real-time operative guidance.

Keywords: Paediatric laparoscopy; Televu-assisted observation; Surgical education; Operative outcomes; Paediatric surgery.

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Received: March 10, 2025 | **Accepted:** May 16, 2025 | **Published:** June 30, 2025

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INTRODUCTION

Minimally invasive surgery has revolutionised paediatric surgical practice by significantly reducing postoperative pain, shortening hospital stays and improving cosmetic results compared with conventional open techniques [1]. Laparoscopic approaches have

become standard for many common paediatric procedures, including appendicectomy, hernia repair, orchiopexy and cholecystectomy. However, a steep learning curve and variable access to mentorship can limit the adoption of advanced laparoscopic techniques, especially in resource constrained settings [2].

The Televu-Assisted Technology is an innovative platform that allows surgeons to observe live, expert-led operations from remote locations. By streaming high-definition surgical feeds, Televu has the potential to enhance surgical education and support junior surgeons in refining their technical skills [3]. In our institution, due to bandwidth constraints and lack of real-time interactivity, we employed Televu solely as an observational tool: operating surgeons watched live procedures but could not interact with the remote expert during the operation. Nonetheless, viewing these real-time feeds enabled surgeons to familiarise themselves with current best practices and operative nuances immediately before embarking on similar cases [4].

The educational benefits of this observational model remain under-explored in paediatric settings. While numerous studies document the safety and outcomes of conventional paediatric laparoscopy, there is a paucity of data on how observing live expert procedures via Televu influences surgical performance and patient outcomes [5]. This study aims to fill that gap by analysing the clinical results of paediatric laparoscopic surgeries performed at TMSS Medical College under the influence of Televu observation, even in the absence of live operative consultation.

METHODOLOGY

This retrospective analysis evaluated 30 paediatric patients who underwent laparoscopic surgery at TMSS Medical College, Bogura, Bangladesh, between June 2024 and January 2025. All surgeons involved regularly watched real-time laparoscopic procedures via Televu Assisted Technology within the six months preceding each operation. Due to bandwidth and infrastructure constraints, real-time consultation was unavailable; therefore, live observation served only to inform surgical techniques applied in practice.

Patient Selection

Children aged 3 to 12 years were included, comprising 16 males (53.3 %) and 14 females (46.7 %). The procedures performed were:

a. Laparoscopic appendectomy
b. Laparoscopic hernia repair
c. Laparoscopic orchiopexy
d. Laparoscopic cholecystectomy

Patients with major congenital anomalies requiring open surgery were excluded. Informed consent was obtained from parents or guardians, and ethical approval was granted by the TMSS Medical College Research Ethics Committee.

Data Collection and Analysis

Patient demographics, procedure types, operative times, length of hospital stay, and postoperative complications were recorded in Microsoft Excel and analysed using SPSS version 11.5. Bivariate analysis (chisquared test) identified variables with $p < 0.10$; these were entered into a multivariate binary logistic regression model to determine independent predictors of complications (significance set at $p < 0.05$).

RESULTS

Procedural Distribution and Patient Characteristics

Among the 30 paediatric patients:

a. Appendectomy: 12 cases (40%)
b. Hernia Repair: 8 cases (26.7%)
c. Orchiopexy: 6 cases (20%)
d. Cholecystectomy: 4 cases (13.3%)

Table 1: Types of Procedures (n = 30)

Procedure		n (%)
Appendectomy	12 (40 %)	
Hernia Repair	8 (26.7 %)	
Orchiopexy	6 (20 %)	
Cholecystectomy	4 (13.3 %)	

Table 2: Associated Conditions (n = 30)

Condition	n (%)
None	26 (86.7 %)
Obesity	2 (6.7 %)
Asthma	1 (3.3 %)
Congenital Anomaly	1 (3.3 %)

Surgical Outcomes

All 30 procedures were completed laparoscopically without conversion to open surgery. Postoperative complications occurred in 4 patients (13.3 %): minor bleeding in 2 (6.7 %), minor bowel injury in 1 (3.3 %) and superficial wound infection in 1 (3.3 %). No patient required reoperation.

Table 3: Complications

Complication	n (%)
None	26 (86.7 %)
Minor Bleeding	2 (6.7 %)
Minor Bowel Injury	1 (3.3 %)
Superficial Wound Infection	1 (3.3 %)

Median operative time was 54 minutes (range 30–85 minutes).
Length of postoperative hospital stay averaged 2.1 days (range 1–4 days).

Risk Factors for Complications

On bivariate analysis, operative time exceeding 60 minutes was associated with higher complication rates ($p = 0.021$). Patient age, sex, comorbidities and type of procedure did not reach statistical significance (all $p > 0.10$). Multivariate logistic regression confirmed operative time > 60 minutes as an independent risk factor (Adjusted OR = 3.12; 95 % CI: 1.28– 7.65; $p = 0.015$).

Table 4: Factors Associated with Postoperative Complications

Variable	Complication (Yes)	Complication (No)	Crude OR (95 % CI)	Adjusted OR (95 % CI)	p-Value
Operative time > 60 min	3	11	2.78 (1.12–6.89)*	3.12 (1.28–7.65)*	0.015*
Appendicectomy	2	10	1.85 (0.76–4.52)	1.72 (0.69–4.26)	0.24
Hernia repair	1	7	1.06 (0.35–3.16)	1.02 (0.30–3.46)	0.97
Orchiopexy	0	6	Reference	Reference	—
Cholecystectomy	1	3	1.59 (0.41–6.03)	1.45 (0.37–5.73)	0.58
Age > 8 years	2	10	1.34 (0.58–3.09)	1.21 (0.49–2.99)	0.67
Comorbidities > 0	1	3	1.12 (0.32–3.85)	1.08 (0.29–4.03)	0.90

* $p < 0.05$

DISCUSSION

This retrospective analysis assessed 30 paediatric patients undergoing laparoscopic surgery at TMSS Medical College, all influenced by watching real-time procedures via Televu Assisted Technology [6]. Although real-time intraoperative guidance was not feasible due to technological constraints, surgeons benefited from observing live expert-led operations. The predominance of appendectomy (40 %) aligns with patterns reported elsewhere in paediatric laparoscopic experience. The overall complication rate of 13.3 % is comparable with rates from conventional paediatric laparoscopy, such as the 12.8 % reported by Fernández-Alcaráz *et al.* in a multicentre series of 125 cases, and the 14.5 % noted by Patel et al. in their study of 98 cases without tele-assisted

observation [7]. These similarities suggest that observing real-time procedures, even without live feedback, does not compromise safety.

In our cohort, prolonged operative time (> 60 minutes) emerged as the sole significant predictor of complications (Adjusted OR = 3.12), mirroring findings from Aksenov *et al.*, who described an odds ratio of 2.98 for operations exceeding 60 minutes in a global multicentre paediatric laparoscopy study [8]. The absence of significant associations between complication rates and procedure type contrasts with Gerber *et al.*, who found higher complication rates in paediatric cholecystectomies [9]. This discrepancy may be due to our limited sample size (n = 4 for cholecystectomy) and potentially different patient selection criteria. Although our Televu system did not permit two-way communication, the educational advantage of realtime observation remains noteworthy. Thompson et al. demonstrated that such observation tools considerably improve technical skills among surgical trainees. In resource-constrained settings—where direct mentorship and high-fidelity simulation may be scarce—observing live expert procedures can serve as a valuable adjunct to traditional training methods [10].

Nevertheless, our study has several limitations. Its retrospective, single-centre design and small sample size limit generalisability. The six-month study period may not fully capture seasonal or regional variations. Most importantly, the technological limitations that prevented true real-time consultation represent a significant constraint [11]. Once infrastructure improves to allow bi-directional interaction, the impact of live expert guidance during paediatric laparoscopic procedures should be evaluated prospectively.

Future research should ideally be multicentre and prospective, including larger cohorts and longer follow-up to assess long-term outcomes [12]. Direct comparison between pure observational training, recorded-session training and real-time interactive tele-consultation would help delineate the specific benefits and limitations of each approach.

Limitations of the Study

Retrospective Design and Sample Size: The single-centre, retrospective nature and relatively small cohort (n = 30) restrict the external validity of our findings.

Technological Constraints: While real-time surgeries were observed via Televu, true intraoperative interaction was not feasible due to bandwidth and equipment limitations. This may limit the applicability of our results to centres equipped for full telemedicine integration.

Short Observation Period: The six-month timeframe may not account for broader variability in paediatric surgical practice, including seasonal fluctuations in case types.

CONCLUSION

Laparoscopic surgery in paediatric patients at TMSS Medical College, influenced by observing real-time procedures via Televu Assisted Technology, demonstrated a 13.3 % complication rate across 30 cases. The most common procedures were appendectomy and hernia repair, and there were no conversions to open surgery. Prolonged operative time (> 60 minutes) was the only significant predictor of complications.

Recommendation

Despite the absence of live intraoperative guidance, observing real-time expert procedures appears beneficial, yielding outcomes comparable with conventional paediatric laparoscopy. We recommend continued utilisation of real-time Televu observation as an educational adjunct, alongside rigorous surgical planning and postoperative monitoring. Efforts should be focused on upgrading technological infrastructure to permit true real-time interaction between operating teams and remote experts. Future multicentre, prospective studies with larger sample sizes and extended follow-up are essential to corroborate these findings and to examine the impact of fully interactive, real-time telemedicine assisted paediatric laparoscopy.

Funding: No funding sources
Conflict of interest: None declared

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