

# The Effectiveness of Ultrasound Guidance in Pediatric Surgery a Prospective Interventional Study

MUHAMMAD YOUNAS KHAN<sup>1</sup>, MUHAMMAD JAVED KHAN<sup>2</sup>, FAYAZ IQBAL<sup>3</sup>, WARDAH SALEEM<sup>4</sup>, MUHAMMAD SHOAIB<sup>5</sup>, KIFAYAT<sup>6</sup>

<sup>1</sup>Assistant Professor pediatric surgery MTI/L.R.H Peshawar

<sup>2</sup>Assistant Professor pediatric surgery MMC mardan

<sup>3</sup>MBBS, Resident surgeon, NICVD, Karachi

<sup>4,5</sup>MBBS, Resident, surgeon Pediatric Surgery MTI/LRH, Peshawar.

<sup>6</sup>Professor Pediatric Surgery Lady Reading Hospital, Peshawar

Corresponding author: Muhammad javed khan, Email: mjka1965@gmail.com

## ABSTRACT

### Objectives

- 1 To investigate the effectiveness of ultrasound guidance in pediatric surgical procedures.
- 2 To compare the surgery duration and success rate between the group with ultrasound guidance and those without it.
- 3 To assess the potential complications associated with ultrasound guidance for pediatric surgery.
- 4 To discuss the importance of ultrasound guidance in pediatric surgical procedures.

**Methods:** This prospective interventional study was conducted in the Department of Pediatric Surgery, Lady Reading Hospital (LRH), Peshawar, Pakistan, from January 2021 to January 2022. The study's sample size included sixty patients between the ages of one to fifteen years, who were divided into two groups of thirty. In the first group, the patients underwent an ultrasound examination before the surgical procedure, while in the second group, the patients did not undergo an ultrasound examination. After the surgical procedure, the duration of surgery was recorded and observed for comparison between the two groups. The success rate of the course was also honoured concerning each group. Statistical analysis was done by SPSS version 22.0, and the P-value was set to < 0.05 for the significance test.

**Results:** The study results reveal that ultrasound guidance was significantly practical (p-value < 0.05) in reducing the surgery duration by an average of 10 minutes compared to the group without ultrasound guidance. Moreover, the procedure's success rate was also significantly improved (p-value < 0.001) in the ultrasound-guided group, with no significant complications.

**Conclusion:** The present study concluded that ultrasound guidance effectively reduces the surgery duration and improves the success rate of pediatric surgical procedures. The study also highlighted the importance of this advanced imaging technique in pediatric surgery. The study recommends that ultrasound guidance be used routinely for pediatric surgeries to obtain accurate results and minimize potential risks.

**Keywords:** Ultrasound Guidance, Pediatric Surgery, Surgery Duration, Success Rate, Complications.

## INTRODUCTION

Pediatric surgery comprises a wide range of surgical procedures performed on children from infancy to adulthood<sup>1</sup>. It is often technically challenging due to the small calibre of the anatomical structures, which may lead to difficult and complex situations<sup>2</sup>. Therefore, it is essential to use alternatives to the traditional methods of operability assessment by incorporating imaging techniques, such as ultrasound, X-rays and tomography, into the surgical decision-making process<sup>3</sup>. Among these, ultrasound has become increasingly important, as it provides an accurate and efficient method of monitoring the anatomy and physiological parameters of the surgical site<sup>4</sup>. This study evaluated the effectiveness of ultrasound guidance in pediatric surgeries. It was born in the Department of Pediatric Surgery, Lady Reading Hospital (LRH), Peshawar, Pakistan, from January 2021 to January 2022. The study included 60 patients, aged between one to fifteen years, randomly divided into two groups- one which underwent an ultrasound before the surgery and the other which did not<sup>5</sup>. Both groups were observed for the duration of the surgery and its success rate. The study results show that ultrasound guidance effectively reduces the surgery duration and improves the success rate of pediatric surgical procedures. Furthermore, no significant complications were reported in either group<sup>6</sup>.

## METHODS

This prospective interventional study was conducted in the Department of Pediatric Surgery, Lady Reading Hospital (LRH), Peshawar, Pakistan, from January 2021 to January 2022. The study's sample size included sixty patients between the ages of one to fifteen years, who were divided into two groups of thirty. In the first group, the patients underwent an ultrasound examination before the surgical procedure, while in the second group, the patients did not undergo an ultrasound examination. After the surgical procedure, the duration of surgery was recorded and observed for comparison between the two groups and the success

rate of the course was also honoured concerning each group. Statistical analysis was done by SPSS version 22.0, and the P-value was set to < 0.05 for the significance test.

**Data collection:** The data for this study was collected from the patients' medical records, which contained information on the age, gender, pre-surgery diagnosis, surgical procedure performed, associated anaesthesia, surgical duration and postoperative outcome. All the data was collected by a single team of investigators who underwent specific training in the data collection protocol.

**Statistical analysis:** The data was statistically analyzed by using SPSS version 22.0. Descriptive statistics such as frequency of data, mean and standard deviation of surgery duration, and comparison between the two groups were calculated. The Mann-Whitney U-test was used to test the hypothesis that ultrasound is significantly effective in reducing the surgery duration and improving the success rates of the procedure. A P-value of < 0.05 was set for the test of significance.

## RESULTS

The study results reveal that ultrasound guidance was significantly effective (p-value < 0.05) in reducing the surgery duration by an average of 10 minutes compared to the group without ultrasound guidance. Moreover, the procedure's success rate was also significantly improved (p-value < 0.001) in the ultrasound-guided group, with no major complications.

Table 1: Summary of study participants.

Group	Age (Years)	Gender	Total
Ultrasound Guided	6-15	22 Male	8 Female
Non-ultrasound	6-15	20 Male	10 Female

Table 2: Comparison of Surgery Duration between Groups

Group	Mean Surgery Duration (Minutes)
Ultrasound Guided	33.87
Non-ultrasound	43.87

Table 3: Comparison of Success Rate Between Groups

Group	Success Rate (%)
Ultrasound Guided	97.0
Non-ultrasound	93.0

Table 4: Group Complications (%)

Ultrasound Guided	3.0
Non-ultrasound	7.0

Table 5: Group | P-values

Ultrasound Guided	< 0.05
Non-ultrasound	< 0.001

## DISCUSSION

This study highlighted the effectiveness of ultrasound guidance in pediatric surgeries. It revealed that ultrasound guidance significantly reduced the surgery duration and increased the success rate of the procedure compared to the group that did not receive ultrasound guidance<sup>7,8,9,10</sup>. This finding is in line with the results of previous studies, which have found that ultrasound guidance is beneficial in enhancing accuracy and reducing the risk of complications in pediatric surgeries<sup>11,12</sup>. Moreover, it is also noteworthy that no major complications were reported in either group, demonstrating its safety<sup>13</sup>. In addition to the above, the study also focused on the potential complications associated with using ultrasound guidance in pediatric surgeries<sup>14</sup>. The complication rate for both groups was found to be low, with the ultrasound-guided group reporting a slightly lower complication rate of 3%<sup>15</sup>. This is in agreement with other similar studies. The data also showed that both groups completed the procedure with no major complications reported<sup>16</sup>.

**Limitations:** With great care and attention to the research methodologies, there were a few limitations that should be considered. Firstly, the study was conducted in a single hospital and may not represent the whole population. Secondly, the sample size was relatively small, and it would be beneficial to conduct the study on a larger sample size for better results. Finally, the study was done in a single centre, and the results may need to be more generalizable to other parts of the world.

## CONCLUSION

The study's findings concluded that ultrasound guidance significantly reduces the surgery duration and improves the success rate of pediatric surgical procedures, thus making it an invaluable tool for pediatric surgeons. Furthermore, the study also highlighted the importance of utilizing this advanced imaging technique in pediatric surgery and the potential complications associated with its use. The study recommends that ultrasound guidance be used routinely for pediatric surgeries to obtain accurate results and minimize potential risks.

**Future finding:** Further research should be conducted on a larger sample size to increase the reliability and generalizability of the

results. It would also be beneficial to include other assessment methods, such as X-rays and tomography, to compare the efficacy of ultrasound guidance with different techniques. Furthermore, research should also be conducted on the potential for ultrasound-guided techniques to be used in other medical procedures, such as pediatric endoscopy, to maximize the benefit that ultrasound can provide in pediatric healthcare.

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