

Smart Robotic Navigation for Degenerative Lumbar Disease Surgery: Improving Quality, Outcome, and Safety at Premier Bintaro Hospital

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is performing a procedure using robot-assisted spine surgery

INTRODUCTION

The significant advancement in lumbar spine surgery over the past two decades has been marked by the evolution of minimally invasive techniques, ensuring clinical efficacy while reducing trauma, bleeding, bed rest, and postoperative complications, with recent research emphasizing the integration of robotic systems, particularly in pedicle screw placement, contributing to surgical success and representing a transformative leap forward in optimizing patient outcomes and advancing the field.

Aim

The aim of this study is to investigate the effectiveness of oblique lumbar interbody fusion (OLIF) and anterior lumbar interbody fusion (ALIF) supported by a robot in the treatment of spinal degenerative disorders.

Methods

This quasi-experimental study involved a retrospective analysis of 38 patients diagnosed with spinal degenerative disorders and treated at Premier Bintaro Hospital between June 2022 and April 2024.

Patients were selected using consecutive sampling and were divided into two cohorts: one group underwent traditional open surgery, while the other received robot-assisted surgery.

Data collected for this study included intraoperative blood loss, incision length, postoperative ICU requirements, and radiation exposure. Postoperative recovery metrics such as hospital length of stay, pain levels, and functional outcomes were also assessed.

Bivariate analysis was performed using independent t-tests to compare outcomes between the robot-assisted and traditional surgery groups.

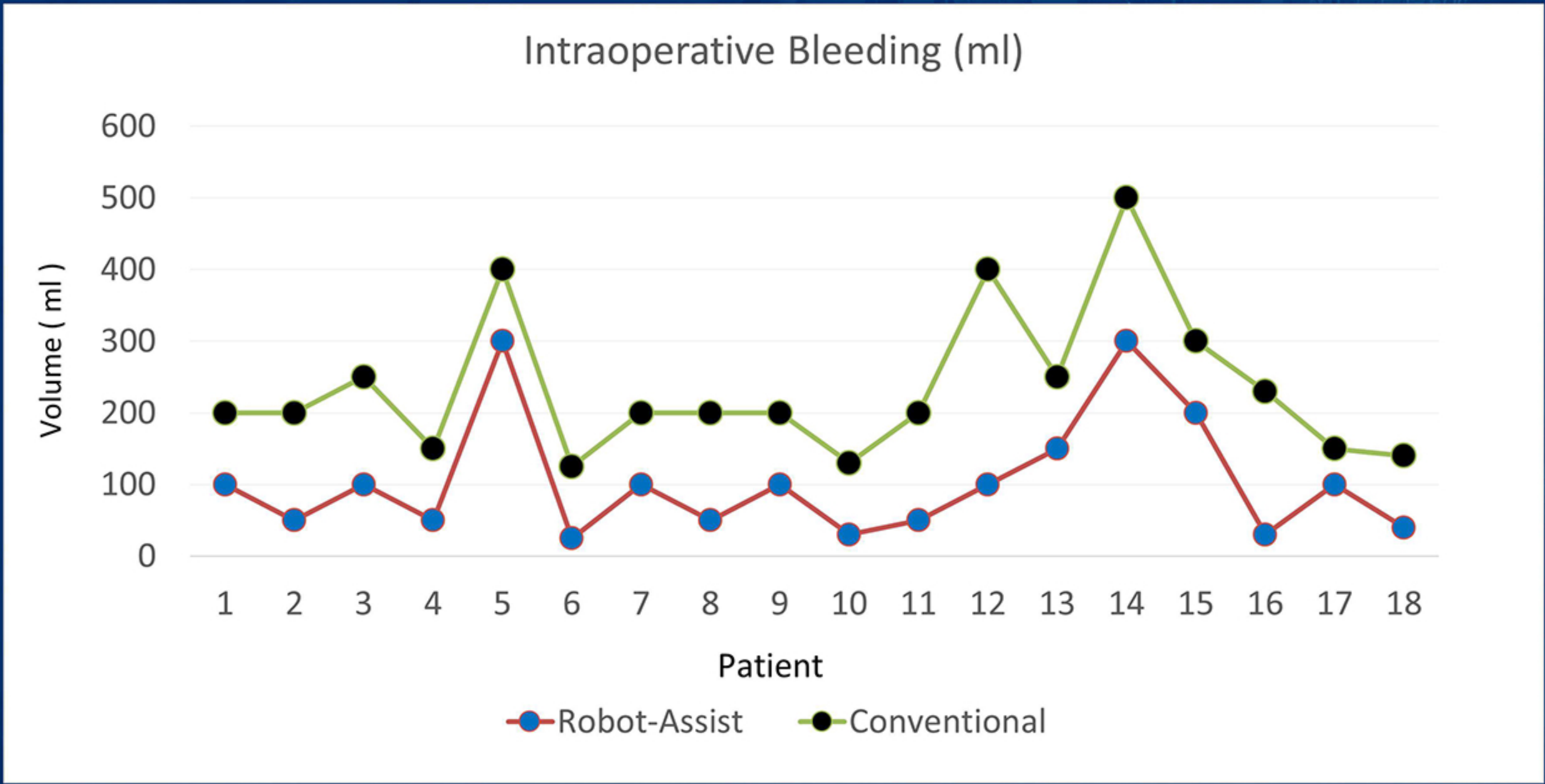
Results

INCISION SIZE:

Conventional surgery: average of 5 cm.
Robotic surgery: average of 2 cm (smaller, less invasive).

INTRAOPERATIVE BLEEDING:

Conventional surgery: average of 130 ml.
Robotic surgery: average of 104 ml (less bleeding, fewer complications).

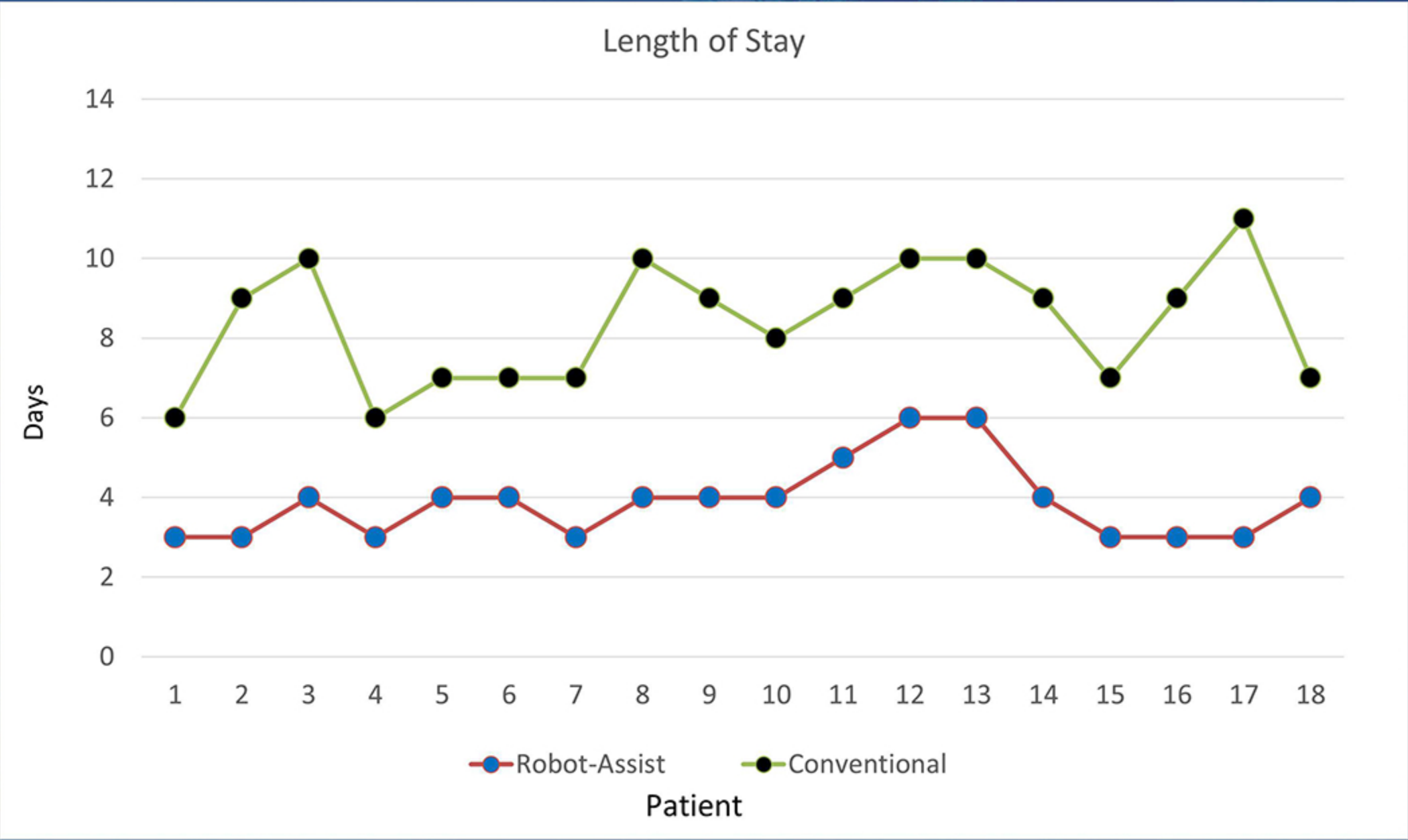


RADIATION EXPOSURE:

Conventional surgery: average of 20.3 mGy.
Robotic surgery: average of 18.4 mGy (lower exposure).

HOSPITAL STAY DURATION:

Conventional surgery: 4-5 days.
Robotic surgery: 3-4 days (shorter stay).



STATISTICAL ANALYSIS:

Intraoperative bleeding and postoperative pain scores were significantly lower in the robotic group (p-value < 0.05).

SAFETY AND RECOVERY:

No surgical-related complications or readmissions during the project implementation at our hospital.
This technology enhances patient safety and optimal recovery.

Conclusion

ADVANTAGES OF ROBOT-ASSISTED LUMBAR SPINE SURGERY:

- ✓ Smaller incisions (2 cm vs. 5 cm)
- ✓ Reduced intraoperative bleeding (104 ml vs. 130 ml)
- ✓ Lower postoperative pain

LIMITATIONS:

- i No significant differences in hospital stay or ICU requirements
- i Unspecified sample size and follow-up duration
- i Unexamined cost comparison between robotic and conventional surgeries

References:

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