# Successful implementation of the robotic platform in a case of a pediatric patient with penetrating thoracoabdominal trauma

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## Background

Over the past two decades, emergency general surgery and acute care surgery have witnessed a paradigm shift from traditional open surgeries in favor of minimally invasive laparoscopic and robotic modalities. Fewer studies have demonstrated the utility of the robotic platform in the setting of emergency trauma surgery, particularly in cases of penetrating trauma to the thorax and abdomen.

Once thought to be relatively contraindicated, the robotic platform does carry several possible advantages compared to the traditional trauma laparotomy when used in the appropriate setting. The theoretical benefits of smaller incisions, less postoperative pain, fewer postoperative wound complications, and decreased hospital length of stay must be balanced against the possible disadvantages of increased cost, staff familiarity with the robotic platform, and the possibility of a missed injury.

Patient selection is paramount, and previous studies have demonstrated that the robotic platform can be safely used in hemodynamically stable patients with specific injury patterns. The following case demonstrates successful implementation of the robotic platform in a pediatric patient who sustained a penetrating thoracoabdominal wound.

## Case Report

The patient is a 13-year-old male who presented as a level 1 trauma for thoracoabdominal and right thigh gunshot wounds. Physical examination revealed stable hemodynamics, a left flank wound, a right thigh entry wound, no exit wounds, and no significant oozing. He had a left-sided pneumothorax, which resolved with placement of a chest tube. CT scan showed a left hemidiaphragm injury, grade 3 splenic laceration, and gastric injury.

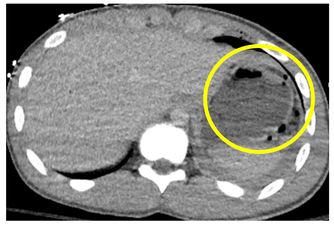


Fig 1: CT abdomen demonstrating extraluminal air near the stomach

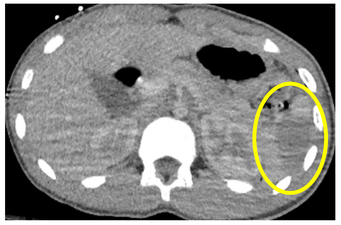


Fig 2: CT abdomen demonstrating grade 3 splenic laceration



Fig 3: Sagittal CT – left anterior diaphragm perforation

He remained hemodynamically stable, so we proceeded with robotic exploration. He underwent a robotic assisted splenectomy, primary repair of gastrotomy x2, primary diaphragm repair x2, and wedge resection of the liver. The spleen was morcellated and removed from the 12 mm incision. JP drains were placed and then removed on postoperative day 9. His postoperative course was complicated by recurrent left pneumothorax which resolved with pigtail catheter placement. After discharge, the patient made a full recovery.

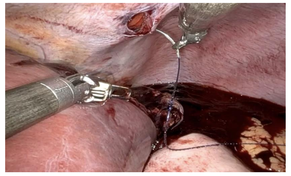


Fig 4: Anteromedial diaphragm laceration

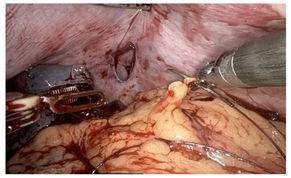




Fig 5 and Fig 6: Anterolateral diaphragm laceration and repair with 0 non-absorbable V-lock suture

## References

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## Case Report

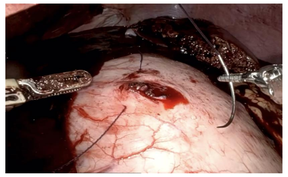


Fig 7: Anterior gastric body laceration



Fig 8: Gastric laceration repair with 2-0 absorbable V-lock

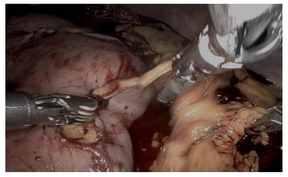


Fig 9: Entry into lesser sac with vessel sealer



Fig 10: Posterior gastric laceration repair

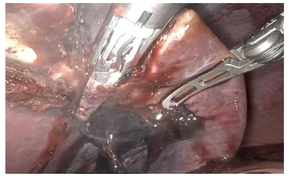


Fig 11: Segment 2 liver wedge resection with vessel sealer

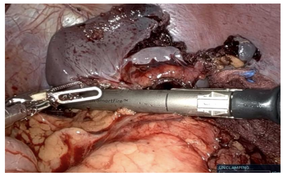


Fig 12: Splenectomy

Note: Figures 4 through 12 are intellectual property of Khoi Le (Khoi-AdvSurgSol) and were borrowed with permission from their video presentation. This case is a virtually indistinguishable representation of the case that we performed with a nearly identical constellation of injuries.

## Conclusion

This case demonstrated the successful implementation of the robotic platform in a penetrating thoracoabdominal trauma in which many injuries were identified and repaired. Prior studies have shown that when used in the appropriate setting in trauma scenarios, the robotic platform offers advantages of lower risk of wound infections, lower rates of pneumonia with no increase hospital length of stay, procedure time, or missed injuries. Future prospective comparison studies should be conducted to evaluate the differences in outcomes between open and robotic surgery in penetrating thoracoabdominal trauma.

## Discussion

Robotic surgery in emergency settings is highly dependent on surgeon's experience and should only be performed in appropriately equipped operating rooms with trained nursing staff.

Robotic surgery in emergency settings should be considered in highly selective clinically stable patients only.

Robotic surgery in emergency settings can be utilized in challenging operating settings that typically would result in conversion from laparoscopic to open surgery.

In trauma patients specifically, laparoscopy decreases risk of wound infection, pneumonia, length of stay, and procedure time with no difference in missed injuries compared to laparotomy.

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