Outcomes and patient tolerability of radical inguinal orchiectomy under deep intravenous sedation

Steven Lu[1,2], Alagarsamy Pandian[3], Jasmir G. Nayak[1,2], Premal Patel[1,2]

[1]Section of Urology, Department of Surgery, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, Canada; [2]Men's Health Clinic Manitoba, Winnipeg, MB, Canada; [3]Department of Anesthesia, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, Canada

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ABSTRACT

INTRODUCTION: Radical inguinal orchiectomy (RO) is indicated for the management of testicular tumors and is universally performed under general anesthetic in the hospital. The need to perform radical orchiectomy in an expeditated fashion can result in logistical difficulties, often necessitating this procedure to happen after-hours on a semi-emergent basis. These logistical difficulties have been exacerbated by the backlog of cases from the COVID-19 pandemic. A similar procedure — inguinal hernia repair — is regularly performed under local anesthesia with minimal complications. Thus, we sought to evaluate the feasibility of performing radical orchiectomy under deep intravenous sedation in an ambulatory surgery center.

METHODS: We evaluated our single-surgeon (PP), prospective database of patients who underwent RO between September 2022 and February 2023 at the Men's Health Clinic Manitoba. Patients were given a combination of deep sedation, ilioinguinal nerve block, and local anesthetic. Tolerability was assessed both perioperatively and at 4–6 weeks' followup. We reviewed the medical records for any postoperative complications.

RESULTS: Eight patients underwent RO under deep sedation during the study period. All patients tolerated the surgery well and were discharged shortly after surgery. Average operative time was 40 minutes and length of stay was 46 minutes. There were no perioperative complications.

CONCLUSIONS: Our pilot study demonstrates that RO can be safely and effectively performed under deep sedation. This anesthetic combination can be used both in-hospital and out-of-hospital settings, thereby resulting in faster recovery, shorter length of stay, and favorable patient and provider satisfaction.

INTRODUCTION

Testicular cancer is the most prevalent type of cancer in young men, with approximately 1200 men diagnosed each year in Canada.[1] The use of contemporary management strategies has resulted in a 95% five-year survival rate for cancer-specific cases. Radical inguinal orchiectomy (RO) is the gold standard for initial management of testicular cancer. Although no studies have evaluated the impact of delayed orchiectomy on pathologic or survival outcomes, the conventional belief in urology has been to promptly perform RO as soon as possible.[2-4] In Canada, this is typically performed in the hospital under general or spinal anesthesia by adding the patient onto an emergency surgical slate as an urgent case or bumping other prescheduled elective cases on short notice. Given the severe surgical backlog accumulated from the COVID-19 pandemic and limited operating room resources, it is increasingly difficult to complete these cases in a timely fashion, and these generally healthy younger men may wait several days fasting in hospital — oftentimes requiring these procedures to happen after-hours or at the expense of another elective case that has likely already waited a prolonged period.

To address the increasing wait times, surgeries that are less complex, such as hernia operations and hip replacements, among others, are being relocated from hospitals to ambulatory centers across the country.[5-7] This is made possible partly due to advancements in pain management and anesthesia options.

KEY MESSAGES

- Radical inguinal orchiectomy can be safely and effectively performed under deep intravenous sedation.
- All patients tolerated the anesthetic combination of deep intravenous sedation, peripheral nerve block, and local anesthetic.
- Advantages over general anesthetic include faster recovery, dramatically shorter length of stay, and higher patient and provider satisfaction.
- This anesthetic combination offers the ability to perform these surgeries in ambulatory surgery centers while leaving hospital resources for cases that require more involved anesthesia.

For example, inguinal hernia repairs, a similar operation to RO, have long been performed under local anesthesia with negligible complications. Advantages of local anesthetic and sedation over general anesthetic include faster recovery and shorter length of stay. This leads to an improved experience for both physicians and providers, while enabling gains in both acute and community care efficiency. There are no studies that have investigated performing RO under intravenous sedation. We sought to evaluate operative and patient tolerability of RO under deep intravenous sedation.

METHODS

In this prospective study, eight consecutive patients were referred for suspected testicular tumor from September 2022 to February 2023 at the Men's Health Clinic Manitoba (MHC). MHC is an accredited outpatient surgical facility. The inclusion criteria were sonographic findings suspicious of a testicular neoplasm, patient willingness to undergo the procedure under sedation, and body mass index (BMI) <30. Patients who were unwilling to be sedated were excluded from the study. Detailed history and physical examination were performed. Tumor markers were done before the operation in every case. Informed consent was obtained for all patients. All procedures were performed at the Men's Health Clinic Manitoba by a single surgeon (PP).

Anesthetic technique

All patients received a combination of sedation, peripheral nerve block, and local anesthetic. Deep intravenous sedation was achieved using ketamine 20 mg IV, midazolam 5 mg IV, propofol 30–50 mg/kg/mt infusion, and remifentanil 0.05 mcg/kg/mt infusion. Ultrasound-guided peripheral nerve block was performed by the anesthesiologist after identifying the ilioinguinal nerve and the adjacent structures (Figure 1). The overlying skin was prepared with antiseptic solution, and a 22G 50 mm Pajunk needle was advanced using in plane approach from a point just below the inferior border of the ultrasound transducer towards the ilioinguinal nerve, as it lies within the fascial plane between the internal oblique and transversus abdominis muscle (Figure 2). Once the proper position of the needle tip was confirmed by injecting a small amount of local anesthetic, 10 ml of 0.25% bupivacaine and 1% lidocaine were injected after

Figure 1. To perform ultrasound-guided ilioinguinal nerve block, the inferior portion of the transducer is place over the previously identified anterior superior iliac spine with superior margin of the transducer pointer directly in an oblique plane at the umbilicus.

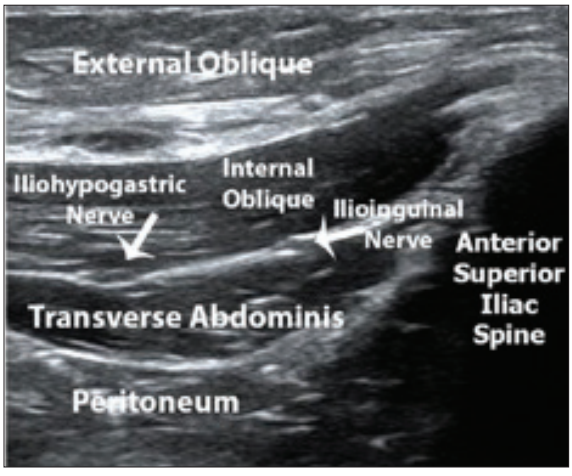

Figure 2. Oblique ultrasound image demonstrating the acoustic shadow of the anterior superior iliac spine and the muscle layers and the fascial plane containing the ilio-inguinal nerve and ilio-hypogastric nerves.

careful negative aspiration in 5 cc aliquots. The surgeon infiltrated the skin and the spermatic cord with 20 cc of 1% plain lidocaine and 0.25% plain bupivacaine.

Surgical technique

All patients underwent RO using the standard technique.[8] Under satisfactory intravenous sedation, a small inguinal incision is made and carried down to the spermatic cord. The ilioinguinal nerve is carefully dissected and retracted medially to preserve it. The spermatic cord is protected with a Penrose drain, which is then looped and tightened as a tourniquet. Further dissection of the spermatic cord distally frees the testicle. The gubernaculum is dissected with electrocautery. Hemostasis is obtained throughout the procedure when needed with electrocautery and surgical ties. When the testicle is delivered, the proximal cord is dissected to the internal inguinal ring. The vas deferens is isolated and tied off separately from the main cord. The cord is then divided between clamps. The testicle is removed. The proximal spermatic cord is then tied with a non-absorbable tie. The proximal cord is then examined for hemostasis. Layer-by-layer closure is done restoring the anatomy. Patients were transferred to recovery and discharged the same day.

Patient tolerability

During surgery, the patients were assessed for tolerability, including verbal pain assessments, heart rate, blood pressure, and respiratory rate. Greater than 20% change in vital signs was used as an indicator of pain during procedure. Tolerability was labeled as tolerable or intolerable whether the above markers were present. Postoperative pain was measured using a pain scale out of 10. Tolerability was also assessed at 4–6-week followup through patient interview.

RESULTS

To date, we performed RO with intravenous sedation for malignant testicular tumor in eight patients. The mean age was 29.3 years (range 20–37), and all patients had a suspicious mass identified on ultrasound. Demographic data is shown in Table 1. All the operations were done under intravenous sedation, peripheral nerve block, and local analgesic as planned. Intraoperatively, there was no reported difficulty enacting the surgical technique. Mean operative time was 39.8 minutes (range 26–55) (Table 2). Using the aforementioned definition, all patients tolerated the procedure well. No patient required termination of the procedure prematurely because of discomfort. Average length of stay postoperatively was 46.3 minutes (range 35–68). Average pain score at the time of discharge was 2/10. Patients were then discharged from the facility with a chaperone and provided with a prescription for analgesia.

Table 1. Patient demographics

Characteristic	All subjects (N=8)
Age (years)	29.3 (20–37)
BMI	25.3 (21–29)
Testicular mass laterality Left Right	 5 3
ASA grade 1 2	 5 3
Ultrasound tumor size, cm (range)	2.4 (0.6–4.3)
No. of patients with abnormal preoperative tumor markers*	6 (75%)

*Defined as alpha-fetoprotein >7, beta-human chorionic gonadotropin >3, lactate dehydrogenase >215. ASA: American Society of Anesthesiologists; BMI: body mass index.

Table 2. Operative data and pathology

Characteristic	All subjects (N=8)
Operative time (min)	39.8 (26–55)
Patient tolerance (%)	8 (100%)
Length of postoperative stay, min (range)	46.3 (35–68)
Average pain score at the time of discharge	2/10
Complications (%)	0 (0.0%)
Histopathology Seminoma, n (%) Non-seminoma, n (%)	 5 (62.5%) 3 (37.5%)
Pathological stage pT1 disease pT2 disease	 5 (62.5%) 3 (37.5%)
Pathologic size of tumor, cm (range)	2.85 (0.7–6.3)
Negative margin status, n (%)	8 (100.0%)

At 4–6-week followup, all patients reported they were doing well, with no concerns regarding procedural intolerability. There were no complications related to the procedure reported by patients or on exam. No patient experienced any cardiac or respiratory complication during or after the procedure.

DISCUSSION

RO for testicular tumor is universally performed under general or spinal anesthesia, as it offers optimal muscle relaxation, immobility of the patient, and intraoperative

control of pain.[8] We demonstrated that RO can be safely and effectively performed using a combination of deep intravenous sedation, nerve block, and local analgesic in select patients. This is the first study to document that RO can be done using this analgesic regimen.

The multimodal anesthetic approach was well-tolerated by all patients subjectively. Objectively, no patient experienced variations of their vital signs to suggest intolerance. The use of ultrasound in performing the ilioinguinal nerve block in our study may have decreased the historical complications that can be associated with the traditional landmark technique and use of smaller amounts of local anesthetic solution.[9] The most dreaded complication of the anatomic landmark-guided ilioinguinal nerve block is the inadvertent placement of the needle too deeply into the abdominal cavity, which is avoided by using ultrasound in our study.[10]

Similar nerve blocks have long been used for open inguinal hernia repairs.[11] In fact, 20% of open inguinal hernia repairs are done using local anesthetic. The addition of intravenous sedation further stops any pain (especially during the traction of the cord) and adds retrograde amnesia. The advantages of this multimodal anesthetic approach over general anesthesia have been well-studied in inguinal hernia repairs. Advantages include lower postoperative pain, faster recovery, and shorter length of stay.[11] Patients in our study were safely discharged within an hour after surgery, as their pain was controlled on oral analgesics. Histopathology showed preserved oncologic outcomes, with all patients having negative surgical margins. Followup at 4–6 weeks demonstrated both high patient satisfaction and patient recovery.

Importantly, the COVID-19 pandemic has resulted in a significant surgical backlog and resource shortage in Canada, which have hindered the ability to perform RO in a timely fashion using the emergency surgical slate. The ability to perform RO in ambulatory surgery centers (without general anesthetics) bypasses the logistical hurdles of the hospital and preserves hospital resources for cases that require more involved anesthesia. Altogether, patients and providers appreciated the expedited care outside of the hospital. The authors acknowledge the unique infrastructure whereby there is access to both hospital and ambulatory surgery center with deep sedation resources may not be currently available to other providers.

Limitations

Our findings provide novel information for surgeons to consider when deciding on their approach to RO but there are several limitations to acknowledge. This is a small sample size, single-center, and single-surgeon study. Patients were selected and generally were thinner (BMI<30) with smaller tumor size (average size 2.85 cm), with no prior inguinal surgical history. In this selected group of patients, surgery under local anesthesia offers an alternative approach to the traditional setting and provides patients with timely surgical access and rapid discharge home without sacrificing patient comfort or oncologic outcomes.

CONCLUSIONS

Our pilot study demonstrates that RO can be safely and effectively performed under deep sedation. This anesthetic combination can be used in both in-hospital and out-of-hospital settings, thereby resulting in faster recovery, shorter length of stay, and higher patient and provider satisfaction.

COMPETING INTERESTS: Dr. Nayak has been a speakers' bureau member for Astellas and participated in clinical trials supported by Zenflow and TerSera. Dr. Patel has been an advisory board member for Boston Scientific; has received a grant from Endo Pharmaceuticals; and participated in a clinical trial supported by Zenflow. All other authors do not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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CORRESPONDENCE: Dr. Premal Patel, Section of Urology, Department of Surgery, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB; Canada; ppatel5@hsc.mb.ca