

Neuroanesthesia and Intensive Care

Pain, nausea, vomiting and ocular complications delay discharge following ambulatory microdiscectomy

[La douleur, les nausées, les vomissements et les complications oculaires retardent le départ après une microdiscoïdectomie ambulatoire]

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Objective: Nowadays, microsurgical discectomy is being performed as an outpatient procedure. A retrospective chart review was done to document factors that delayed discharge or led to unanticipated admission.

Methods: After Institutional Review Board approval, the hospital medical records of 106 patients who underwent microsurgical discectomy on an ambulatory basis were reviewed. All patients were operated upon by a single surgeon at the Toronto Western Hospital. Perioperative data were collected on specifically designed data sheets. All anesthetic and surgical factors that affected discharge were noted.

Results: Of the 106 patients reviewed, only six required unanticipated admission. Two patients were admitted due to nausea and vomiting, one due to severe pain, one due to urinary retention and two were surgical causes (dural tear). Eight patients had delayed discharge. Anesthesia causes were severe nausea, severe pain, low oxygen saturation, sore throat and dry eyes. Two patients had surgical causes. The incidence of postoperative nausea was 61% and postoperative vomiting was 9.4%. Eighty patients (75.4%) complained of pain in the postanesthesia care unit. Of these, 33.9% had visual analogue pain scale scores more than 6.

Conclusion: Ambulatory lumbar microdiscectomy can be carried out as an ambulatory procedure with an acceptably low unanticipated admission rate (5.7%). The percentage of patients with severe nausea (16%) and pain (33.9%) is high. Adequate perioperative pain management and effective control of nausea and vomiting may further improve the patients' experience after anesthesia for ambulatory microdiscectomy.

Objectif : Aujourd'hui, la microdiscoïdectomie est réalisée en chirurgie ambulatoire. Une revue rétrospective des dossiers a été faite afin de consigner les facteurs qui retardent le départ ou mènent à une hospitalisation imprévue.

Méthode : Après avoir obtenu l'accord du Comité de révision institutionnel, nous avons passé en revue les dossiers médicaux de 106 patients qui ont subi une discoïdectomie microchirurgicale ambulatoire. Tous les patients ont été opérés par un seul chirurgien au Toronto Western Hospital. Les données périopératoires ont été recueillies sur des fiches techniques spécifiquement conçues pour l'étude. Tous les facteurs anesthésiques et chirurgicaux pouvant influencer le départ ont été notés.

Résultats : Parmi les 106 patients dont on a revu le dossier, seulement six ont dû être hospitalisés. Deux ont été admis pour nausées et vomissements, un pour douleurs intenses, un pour rétention urinaire et deux pour des causes chirurgicales (lacération durale). Huit patients ont vu leur congé retardé. Les causes anesthésiques étaient des nausées sévères, de la douleur intense, une faible saturation du sang en oxygène, un mal de gorge et une sécheresse oculaire. Pour deux patients, les causes étaient chirurgicales. L'incidence de nausées postopératoires était de 61 % et de vomissements postopératoires de 9,4 %. Quarante-vingts patients (75,4 %) ont eu des douleurs en salle de réveil, dont 33,9 % selon des scores de plus de 6 à l'échelle visuelle analogique.

Conclusion : La microdiscoïdectomie lombaire ambulatoire peut être réalisée comme telle et affiche un taux acceptable d'hospitalisation imprévue (5,7 %). Le pourcentage de patients victimes de nausées sévères (16 %) et de douleur (33,9 %) est toutefois élevé.

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Le traitement adéquat de la douleur périopératoire et le contrôle efficace des nausées et des vomissements atténueraient davantage les inconvénients de l'anesthésie.

THERE has been a tremendous increase in the scope and extent of surgical procedures being carried out on an ambulatory basis. Advances in surgical techniques have shown a trend towards shorter and less invasive procedures and standard open procedures have been modified to become less invasive. This has led to decreased recovery time, early discharge from hospital and, ultimately, cost savings.¹ The excellent safety record of ambulatory surgery and anesthesia is well established. Most of the morbidities that occur are minor. However, minor non-life threatening adverse events, including excessive postoperative pain, nausea and vomiting, dizziness, drowsiness and untoward cardiovascular events have been reported after ambulatory anesthesia.²

Several studies have shown that lumbar microdiscectomy is an excellent alternative to standard discectomy.^{1,3-8} Microdiscectomy, conventionally performed as an inpatient procedure, is being done on ambulatory basis since 1997 in our hospital. Outcome studies of ambulatory microdiscectomy have focused mainly on surgical factors. Patient education and minimization of perioperative opioids have been reported to promote successful discharge following ambulatory microdiscectomy.⁹ We reviewed the anesthetic management of patients undergoing ambulatory microdiscectomy to identify all factors that affect outcome, delay discharge or lead to unanticipated admission.

Methods

After obtaining Institutional Review Board approval, we reviewed the hospital medical records of 106 patients treated by lumbar microdiscectomy by a single surgeon on an ambulatory surgery basis at the Toronto Western Hospital, a tertiary referral centre for neurosurgery, between February 1997 and September 2001. Preoperative work-up and consultation with an anesthesiologist were arranged in the preadmission clinic. Patients were educated in the preadmission clinic regarding their perioperative course, recovery, discharge and postoperative recovery at home.

Inclusion criteria for ambulatory microdiscectomy were patient's preference, patients who lived in the city, had a safe home environment, had caring help at home and had easy access to emergency medical services. Reoperative discectomy was not a contraindication, nor was a dural tear an indication for admission

postoperatively. Patients who required *iv* opioids postoperatively, patients who needed more extensive procedures like laminectomy, and those on chronic opioid therapy preoperatively were excluded from our study.

All patients received a similar general anesthetic consisting of propofol 2–2.5 mg·kg⁻¹, midazolam 1–2 mg, and fentanyl 1–1.5 µg·kg⁻¹ intravenously at induction. Rocuronium 0.7–0.9 mg·kg⁻¹ was administered to facilitate intubation, followed by desflurane or sevoflurane in combination with nitrous oxide N₂O (60%) in oxygen for maintenance of anesthesia. Additional fentanyl 1–2 µg·kg⁻¹ was given as additional analgesia as needed. Intravenous morphine or ketorolac was given as additional analgesia at the discretion of the anesthesiologist. At the end of surgery, the inhaled anesthesia was discontinued. Residual neuromuscular blockade was reversed with glycopyrrolate 0.01 mg·kg⁻¹ *iv* and neostigmine 0.05 mg·kg⁻¹ *iv*. All were in the prone position on a Karlin frame. Data pertaining to patient characteristics (age, sex, ASA physical status, body mass index and the preoperative history and physical examination) were recorded. Anesthetic technique including drugs, patient monitoring, perioperative complications and time of discharge were also noted. In addition, data relating to surgical diagnosis, type of surgery, total anesthesia and surgical time were collected. In the postanesthetic care unit (PACU) data were collected regarding vital signs, pain scores, surgical and anesthetic adverse events, drugs administered, and duration of stay. Postoperative assessment in the ambulatory surgical unit included duration of stay and adverse events. Any surgical complications, unanticipated admissions or readmissions, were also recorded.

Results

Anesthesia records, PACU and day surgery unit records of 106 patients who underwent lumbar microdiscectomy were reviewed. All were adult patients with a mean age of 43 yr and were mostly males (Table I). Most were ASA I (51.8 %) who underwent surgery at the L5–S1 level (50%). The mean duration of anesthesia was 160 min (85–280).

Intraoperative events included tachycardia in one patient which resolved after desflurane was switched to sevoflurane and one patient developed ventricular ectopic beats. Two patients had a difficult intubation, one had an accidental extubation while turning prone and one, a known *iv* drug abuser, had difficult *iv* cannulation.

In our series of 106 patients, there were no readmissions. Sixteen percent (17/106) of patients had severe nausea and vomiting requiring treatment with antiemetics. Twenty-six patients had received droperidol (0.625 mg) intraoperatively (24.5%) and six

TABLE I Demographics of the patients, duration of stay and surgical sites

<i>Patient characteristics</i>	
Age (yr)	43 ± 11
Weight (kg)	77 ± 15
Height (cm)	172 ± 11
Males:Females	64:42
ASA 1/2/3	55/49/2
<i>Duration</i>	
Time in PACU (min)	75 (40–230)
Time in DSU (min)	215 (70–386)
Duration of anesthesia (min)	160 (85–280)
<i>Surgical site</i>	
L ₅ -S ₁	53
L ₄₋₅	47
L ₃₋₄	6

PACU = postanesthesia care unit; DSU = day surgery unit. Mean ± SD.

TABLE II Perioperative use of analgesics

<i>Analgesics</i>	<i>Number</i>	<i>Percentage (%)</i>
Morphine	33	31
Fentanyl	16	15
Meperidine	7	7
Codeine	11	11
Ketorolac	2	2
<i>Intraoperative use</i>		
Fentanyl µg (<i>n</i> = 106)	265 ± 80	
Morphine mg (<i>n</i> = 72)	10.4 ± 6	
Ketorolac mg (<i>n</i> = 17)	26.5 ± 7	
<i>PACU use</i>		
Fentanyl µg (<i>n</i> = 26)	65 ± 14	
Morphine mg (<i>n</i> = 56)	8.6 ± 5	
Demerol mg (<i>n</i> = 6.6%)	42 ± 20	
Oral analgesia (<i>n</i> = 55)	1–2 tablets (30 mg acetaminophen and codeine combination)	
<i>DSU use</i>		
Demerol mg (<i>n</i> = 2)	40	
Oral analgesia (<i>n</i> = 31)	1–2 tablets (30 mg acetaminophen and codeine combination)	

PACU = postanesthesia care unit; DSU = day surgery unit. Mean ± SD

patients received granisetron (1 mg; 5.6%) as prophylactic antiemetics.

Postoperatively, analgesia was requested by 75.4% (80/106) of patients (Table II). Nearly 40% of the patients were on oral analgesics preoperatively. Thirty-four percent of patients (36/106) complained of moderate to severe pain and had visual analogue scale scores of 6 or more.

Ten patients (9.5%) vomited, 4% (4/106) complained of dizziness, and 3% (3/106) were drowsy in

the PACU. Surgical complications included a dural tear in four patients (4%), redo discectomy in six patients (6%) and root sleeve tear in one patient (1%).

The incidence of unanticipated admissions was 5.7% (6/106). Two patients (1.8%) had severe nausea and vomiting and were admitted overnight for *iv* fluid administration. One of these patients had received *iv* morphine for postoperative analgesia. One patient had urinary retention postoperatively requiring catheterization due to an enlarged prostate. Two patients were admitted for a surgical cause (dural tear).

Delayed discharge was observed in eight patients. One patient had severe nausea that responded to antiemetics, one patient had severe pain. One patient had low oxygen saturation in the PACU and needed supplemental oxygen postoperatively. One patient had a sore throat following a difficult intubation requiring four attempts. Two patients complained of eye irritation in the PACU requiring ophthalmology consultations. They were diagnosed to have dry eyes and corneal abrasion was ruled out. Two patients had surgical causes for a delayed discharge. One patient had bleeding from the surgical site requiring compression dressing and one had persistent leg weakness.

Discussion

The adverse outcomes in our study were severe pain, postoperative nausea and vomiting (PONV) causing delayed discharge and unanticipated admission to the hospital after anesthesia for ambulatory microdiscectomy. Unanticipated admission represents the most widely used outcome measure of quality ambulatory anesthetic care. It represents a failure of the stated goal of admitting, treating and discharging the patients the same day. Our results indicate the incidence of unanticipated admission to be 5.7% compared to 0.3–1.4% reported in the literature for ambulatory anesthesia and surgery.^{10,11} However, this does not detract from the accruable benefits of anesthesia for microdiscectomy on ambulatory basis. An incidence of approximately 6% translates to saving 94 days or more of probable inpatient hospitalization. In our institution, the average length of stay after a lumbar microdiscectomy was 1.6 days before an outpatient lumbar microdiscectomy protocol was instituted.¹²

Postoperative pain was a major finding in our study. The incidence of moderate to severe pain was 34%. The high incidence of postoperative pain may be related to the pre-existing lumbar pain, the surgical procedure and our limitation of intraoperative analgesic to fentanyl. Furthermore, concerns over bleeding induced by perioperative administration of non-steroidal anti-inflammatory drugs and the reluctance of

the surgeon to infiltrate the wound with local anesthetics, predispose to the high incidence of postoperative pain in this group of patients. Multimodal analgesia is a favoured approach to postoperative pain management. The problem of bleeding at the surgical site associated with the use of ketorolac and related drugs, may be obviated with the use of the selective cyclo-oxygenase type 2 (COX-2) inhibitors.¹³ There is evidence in the literature to support wound infiltration with bupivacaine for microdiscectomy.^{14,15} In contrast, Mack *et al.*¹⁶ did not find the intraoperative use of ketorolac or bupivacaine to be beneficial in reducing postoperative morphine requirements. Rather, severe pain prior to surgery was the major determinant of postoperative morphine consumption.¹⁶ Other methods advanced for the management of pain in these patients include wound irrigation with cold bacitracin and postoperative cooling,¹⁷ and intrathecal morphine.^{18,19} Although useful, intrathecal morphine is not suitable for the ambulatory patient for fear of delayed respiratory depression. We speculate that a multimodal approach including wound infiltration, use of COX-2 inhibitors and opioids would improve pain control in the postoperative period.

PONV is the “big little problem”²⁰ of ambulatory anesthesia. PONV was a reason for delayed discharge and unanticipated admission in our study. Specifically, nausea has been implicated as the most important factor determining the length of stay after ambulatory anesthesia.²¹ Several reasons, particularly patient related factors including postoperative opioids, have been described for the high incidence of PONV.^{22–24} The high incidence of postoperative pain in our patients and consequent use of opioids may have aggravated PONV. The incidence of PONV may be reduced by limiting the number of risk factors. The risk of PONV may be reduced by administration of prophylaxis for high risk patients, limiting the use of emetogenic anesthetics, and minimizing postoperative opioids. In addition, adequate fluid therapy has been reported to reduce not only PONV but other adverse outcomes like thirst, drowsiness and dizziness after ambulatory procedures.²⁵ This rather simple but effective therapy should be encouraged in the anesthetic management of the ambulatory patient.

Eye injuries are increasingly being recognized after non-ocular surgical procedures. Dry eyes are probably the mildest form of ocular injury. Others include corneal abrasions, blurred vision, red eye, chemical injury, direct trauma, and even blindness.^{26,27} Failure of the eyelids to close fully during general anesthesia may lead to corneal drying and corneal abrasion.²⁸ General anesthesia reduces both the production and the stabil-

ty of tears and therefore increases the incidence of dry eyes.^{28,29} The application of ointment and adhesive tape to the eyes may limit this complication. Cautious positioning of the patient in the prone position to avoid pressure on the eyes may further improve the outcome.

Conclusion

Severe postoperative pain, PONV and ocular complications were the major causes of delayed discharge or unanticipated admission after ambulatory microdiscectomy. Multimodal perioperative pain control, attenuation of baseline risk for PONV and utilization of adequate fluid management may improve outcome. Attention to details of care of a patient in the prone position could further improve outcome. Nevertheless, ambulatory microdiscectomy is a promising alternative to the conventional management of these patients.

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