
Regional anaesthesia for outpatient surgery – A summary of 12 years' experience

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Many surgical procedures are minor in nature and would not require hospitalization postoperatively, except that they require an anaesthetic and hospitalization for postanaesthetic observation. When our Ambulatory Surgery Unit was established in 1969, the major question was whether such surgery could be performed on an outpatient basis in a safe and high-quality manner. Also, there was question as to whether the charges would be reimbursed if the surgery were not done on an inpatient basis. Outpatient surgery has grown to the point today to where the question is *how* the medical facility will provide these services, and in the future we may well experience an era where funding agencies will demand that certain types of operations be done only on an outpatient basis or there will be no compensation.

One recent publication listed over 300 surgical procedures which can be performed in outpatient facilities. Such a variety of procedures require a variety of anaesthetic techniques. General anaesthesia is probably the most common technique used for both inpatients and outpatients. However, regional block anaesthesia with its selective local action can offer an excellent alternative to general anaesthesia in the outpatient setting. Regional block anaesthesia offers the following potential advantages over general anaesthesia for such patients: (1) Only the actual area or extremity involved in the surgery need be anaesthetized. (2) The "hangover" or nausea and vomiting seen with general anaesthesia are infrequent following nerve block anaesthesia. It has been shown that although modern general anaesthetic drugs offer the patient rapid return to consciousness, coordination is significantly impaired for as long as 24 hours following its administration.¹ (3) Peripheral nerve block mini-

mizes the danger of aspiration in outpatients who can generally be assumed to have a full stomach. (4) Postanaesthesia nursing care is decreased. (5) Post-anaesthesia hospital recovery time is less than with general anaesthesia. (6) Certain regional block techniques provide prolonged local anaesthesia and thus delay the need for analgesics until the patient has returned home.

These potential advantages justify an increasing reliance on regional anaesthesia in the ambulatory surgery patient.

Regional block anaesthesia is not, however, universally appropriate and the proper selection of patients, procedures, and surgeons is essential for success. Although patients considered eligible for outpatient surgery are suitable candidates for most types of anaesthesia, the use of a regional technique requires more patient acceptance and co-operation than is needed for general anaesthesia. An extremely apprehensive or reluctant patient is likely to require sufficient supplemental "sedation" to negate the relative advantage of the block technique. Finally, the surgeon must be supportive of regional techniques, both in preoperative discussions with the patient and intraoperative management of the procedure. They must be willing to conduct the surgery gently, realizing that the patient under block anaesthesia may perceive pressure as pain. Also, the surgeon must occasionally be willing to wait a few minutes for the block to "set up." Surgeons who are convinced of the advantage of block anaesthesia in providing greater alertness and earlier recovery for their patients are willing to

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tolerate these occasional inconveniences and may even suggest regional anaesthesia to their patients.

Although outpatient surgery may be advantageous to the patient, it does create certain potential problems for the anaesthesiologist. These mainly concern the lack of time available for development of rapport between patients and medical personnel, a reduction in the time period for adequate preoperative evaluation of the patient, and the difficulty in evaluating a late postoperative complication or postanaesthesia follow-up. With experience, ours and most outpatient facilities have developed various methods to minimize these problems. All of the units, including our own, have developed some kind of printed informational instruction sheet which emphasizes maintaining NPO status, explanation of the procedure, anaesthetic techniques available, and other significant details. This is either mailed or given to the patients when their surgery is scheduled. Further rapport may be established by having the patient (and/or parents, in the case of children) meet with the anaesthesiologist prior to the day of surgery. Although this is desirable, it is frequently most inconvenient and probably unnecessary. Our own policy has been to have informational brochures handed out in the surgeon's office at the time patients are seen and scheduled for surgery. Those who wish to be invited to stop by the unit in order to have questions answered or familiarize themselves with its location prior to the day of surgery. All patients are called the day prior to scheduled surgery and informed as to the time of their surgery. They are requested to appear at the reception area one hour prior to the scheduled time. At that time, they are met by the anaesthesiologist scheduled to perform the anaesthetic and evaluated as indicated. Informed consent for the anaesthetic, additional lab work, consultations, or questions are all taken care of at that interview. Besides evaluating the physical status of the patient, a preoperative visit is essential for consistently successful regional anaesthesia because it permits the anaesthetist to establish rapport with the patient and explain the anaesthetic procedure. A well-informed patient is a more co-operative patient. While premedication is desirable, blocks done for outpatient surgery are best performed without premedication, substituting rapport, skill, dexterity, and gentleness and explaining each step to the patient along the way. It may be

necessary to give children or apprehensive adults a short-acting narcotic, e.g., fentanyl, or a tranquilizer, e.g., diazepam. Continuous psychological support is probably more important than any drugs. Methohexital, given rectally in a dose between 10 and 25 mg·kg⁻¹ of a ten per cent solution is very effective for uncooperative children.² It is rarely necessary to give an anticholinergic drug and the complaint of the dry mouth, particularly in patients scheduled to have regional block procedures, is eliminated.

To ensure the highest incidence of satisfactory anaesthesia and to keep to a minimum the number and kinds of complications that may occur during any regional block procedure, it is necessary that the anaesthetist know precisely what surgical procedure is planned and the duration anticipated. Therefore, it is imperative that a preoperative consultation between the surgeon and the anaesthetist has taken place.

After determining the needs of the surgeon and the desires of the patient, the anaesthetist can intelligently select the nerves to be blocked and the local anaesthetic drugs to be used. The choice of local anaesthetic drugs will usually be based upon the duration and extent of the surgical procedure. However, one basic principle is imperative and generally accepted. Only the smallest amount of the anaesthetic in a solution of the lowest possible concentration that will give the desired effect should be used. The local anaesthetic drugs available, their duration, and relative toxicity, are as listed in Table I. If possible, regional anaesthesia for the outpatient should be performed taking the same sterile precautions as those taken for inpatient surgical operations. Sterile gloves and perhaps a gown should be worn. The skin should be prepared as for an operation. An indwelling intravenous needle or catheter should be entered into a readily available peripheral vein in all cases other than very minor surgical procedures. Fine gauge, sterile, short bevel needles should be used, being assured that they have not been bent or have hooks on the points. If paresthesias are sought, it is advisable to withdraw the needle slightly in order to avoid an intraneural injection. Aspiration is essential before all injections. This has to be done in at least two planes – turning the needle 180° to minimize the potential for an intravascular injection. Once the local anaesthetic has been administered, the patient

TABLE I Local anaesthetic drugs employed for abdominal anaesthesia - epidural

	<i>Usual conc.</i> (%)	<i>Usual vol.</i> (ml)	<i>Total dose*</i> (mg)	<i>Duration</i> (min)
Procaine	1-2	15-30	600	30-90
Chloroprocaine	1-3	15-30	900	
Lidocaine	1-2	15-30	500	60-180
Mepivacaine	1-2	15-30	500	
Prilocaine	1-3	15-30	600	
Tetracaine	0.25-0.5	15-30	150	
Bupivacaine	0.25-0.75	15-30	225	180-360
Etidocaine	1-1.5	15-30	300	

*Doses of epinephrine-containing solutions.

should never be left alone. Disposable regional block trays are available, but anaesthetists performing a large volume of peripheral nerve blocks will usually prefer to put up their own trays because of the superior quality of the syringes and needles which may be used.

Complications or untoward incidents are possible with any application of any local anaesthetic, be it from surface anaesthesia, infiltration regional anaesthesia, field block, peripheral nerve block, or intravenous anaesthesia. Severe reactions of a toxic nature are practically always caused by faulty technique, wrong application, or overdosage. This means an absolute or relative overdosage can lead to a high blood level of the respective local anaesthetic drugs. Neurologic, psychic, cardiovascular or respiratory arrest, cardiac failure, or convulsions may be prevented by adhering closely to the recommended safety precautions. Local complications such as oedema, infections, abscesses, necrosis, and gangrene are nearly always caused by unsterile handling. Gangrene and ischaemia can likely be prevented if the solutions contain no adrenaline or other vasoconstrictors. The simultaneous use of tourniquets with solutions containing vasoconstrictors for obtaining bloodless fields is also relatively contraindicated. An overdose of the local anaesthetic or an allergic reaction is extremely rare. Most toxic reactions occur when a local anaesthetic drug is injected into a heavily vascularized area. Drugs and resuscitation apparatus should be available at all times.

Theoretically, blocking the proper peripheral nerve should permit any surgical procedure to be performed. In order to see whether or not this was

also practically possible, I have reviewed the anaesthetic procedures which were performed in our outpatient surgical unit for the past year. The specific regional block techniques and the surgical procedures for which they were performed are summarized in Table II.

This discussion has covered only some of the commonly used techniques of regional anaesthesia and outpatient surgery. In addition, there are multitudes of specialized blocks, such as superficial cervical plexus blocks, and many diagnostic and therapeutic pain procedures which can be adopted for use in outpatients. I have made no attempt to establish the actual numbers of each of the surgical procedures which have been performed under regional block anaesthesia, but there is no doubt that under our particular outpatient service, the greatest majority would be lumbar epidural blocks for outpatient laparoscopy. Studies which we have conducted in our Ambulatory Surgery Unit over the past four years comparing the recovery time and complications associated with the various types of general anaesthesia and the various local anaesthetic drugs available for peridural anaesthesia when used for outpatient laparoscopies have demonstrated a significant advantage for this type of anaesthesia in our surgery (Table III).³ In view of reluctance by some anaesthesiologists to use 2-chloroprocaine because of potential toxicity,⁴ we conducted a recent study comparing other available local anaesthetic drugs and concluded that two per cent prilocaine was the most predictable local anaesthetic drug and should be considered as a suitable substitute for 2-chloroprocaine (Table IV).

Prior to discharge, the patient should recover

TABLE II Summary of regional blocks and surgical procedures

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- 1 *Nerve blocks of the head and neck.* (Ring infiltration of the scalp, infraorbital or mental nerve block at the appropriate foramen, superficial cervical nerve block.)
- Jaw wiring - mandibular block
 - Cervical node biopsy - cervical block
 - Excision of mass in neck - cervical block
 - Revision of lip scar - infraorbital block
 - Blepharoplasty - infraorbital and supraorbital block
 - Dermabrasion of chin - mental block
 - Suture of multiple lacerations of scalp - scalp block
- 2 *Blocks of the upper extremity.* (Interscalene (Winnie) block, axillary block, or intravenous regional (Bier) block.)
- Interscalene or supraclavicular block:
 - Reduction of a dislocated shoulder
 - Closed reduction of Colles fracture
 - Excision of bone cyst of hand
 - Excision of mass, antecubital fossa
 - Debridement of osteo tract, left elbow
 - Epicondylar stripping
 - Axillary block:
 - Arthrodesis of index finger
 - Repair of lacerated tendons
 - Carpal tunnel syndrome
 - Removal of K-wires
 - Excision of osteoma, ring finger
 - Repair of digital nerves
 - Excision of tumor, ring finger
 - Lipoma of forearm
 - Excision of lipoma of shoulder
- 3 *Block of the thorax* (Intercostal block).
- Breast biopsies
 - Excision of axillary node
 - Removal of sternal suture granuloma
 - Removal of lipoma from back
 - Excision of sternal sinus tract
- 4 *Blocks for superficial procedures on abdominal wall* (Intercostal nerve blocks or field block).
- Umbilical herniorrhaphy
 - Excision of lipoma, abdominal wall
 - Removal of abdominal scar, stitch granuloma
 - Inguinal herniorrhaphies, performed under herniorrhaphy field block
- 5 *Blocks of the leg* (sciatic and femoral nerve blocks).
- Exostosectomy of the foot
 - Removal of screw from ankle
 - Bunionectomy
 - Foreign body removal from foot
 - Foreign body removal from knee
 - Removal of screws from femur
 - Excision of neuroma of foot
 - Correction of hammer toe
 - Reduction of dislocated hip (lidocaine spinal)

6 *Blocks for gynaecological procedures.*

- Caudal:
 - D and C
 - Cervical polypectomy
 - Modified Shirodkar suture
 - I and D of Bartholin cyst
 - Spinal:
 - Fulguration, vaginal carcinoma
 - Fulguration, rectal carcinoma
 - Prostate biopsy
 - Lumbar epidural:
 - I and D of pilonidal cyst
 - Diagnostic laparoscopy with or without tubal ligation
 - Arthroscopy
 - Inguinal herniorrhaphy
 - Depomedrol pain blocks
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sufficiently from anaesthesia to approach his or her preoperative mental status. This does not imply full recovery, since the patients may have received drugs that cause a sedated state. All patients are instructed not to work or drive for 24 hours no matter whether their anaesthetic is general or regional block. Every patient is evaluated carefully by the anaesthesiologist before he or she is discharged home and given *written* postoperative instructions that are specific to their needs.

The need for postoperative analgesics will depend on the nature of the surgery and the needs of the patient. Patients who have had a regional block anaesthetic, particularly when used on an extremity, may have residual anaesthesia present upon discharge. They must be provided with an appropriate sling and protection for the numb extremity. Those who have received peridural or spinal blocks must have a full recovery of motor function before discharge. If all sensory anaesthesia has regressed, particularly with full return of perineal sensation, then sympathetic blockade and orthostatic hypotension will usually not be a problem on ambulation.⁵ As noted before, because most of these patients who have regional block anaesthesia have had minimal premedication or sedation, they spend a shorter period of time in the postoperative recovery unit than those having general anaesthesia. Occasionally when the epidural or spinal block wears off, pain is so severe as to preclude discharge. This problem has been obviated recently by infiltration of the surgical incision at the end of the procedure using a long-acting local anaesthetic drug (0.25 per cent bupivacaine or one per cent etidocaine) which

TABLE III Laparoscopy recovery study

	Average recovery time	Range	Complications
General anaesthesia	2 hr 56 min	1 hr - 5 hr 40 min	18% nausea and vomiting 12% sore throats 3 (1%) aspirations
Lumbar epidural 2% chloroprocaine	1 hr 43 min	43 min - 4 hr 30 min	4% nausea and vomiting 2% headaches

will allow a fairly long postoperative period of analgesia while the patient is recovering. Research is also being done on the use of transcutaneous nerve stimulators to reduce the amount of post-operative pain and thereby reduce the need for medication.

When our outpatient service was originally established, only patients who were ASA physical status I were admitted to the service. Gradually, as experience has accumulated, we have revised the criteria until now patients of any physical status are accepted, providing they are appropriate candidates for outpatient surgery. This has resulted in a gradual increase in number and percentage of surgical patients done as outpatients over the past ten years. As the criteria for physical status have been changed, the number of patients done under some form of regional anaesthesia has increased until at the present time this includes more than 50 per cent of the patients on some services. The main factor contributing to this successful application of regional anaesthesia is the adherence to the technique and principles of management which have been enumerated. The techniques have resulted in a shortened postanesthesia recovery period and fewer postanesthesia complications for patients having surgery on an outpatient basis. Surgeon, anaesthesiologist, and patient acceptance has been excellent. The use of regional block anaesthesia in

the outpatient seems to be limited only to the imagination and the ability of the anaesthesiologists and the surgeons involved.

References

- 1 Arlow SM. Recovery time from general anesthesia: a comparison of technique. *J Reprod Med.* 1978; 20: 341.
- 2 Berry FA. Preoperative assessment and general management of outpatients. *Int Anesthesiol Clin.* 1982; 20(1): 3.
- 3 Bridenbaugh LD, Soderstrom RM. Lumbar epidural block anesthesia for outpatient laparoscopy. *J Reprod Med.* 1979; 23: 85.
- 4 Ravendran RS, Bond VK, Tasch MD, Gupator CD, Luerssen TG. Prolonged neural blockade following regional anesthesia with 2-chloroprocaine. *Anesth Analg.* 1980; 59: 447.
- 5 Pflug AE, Aasheim GM, Foster C. Sequence of return of neurological function and criteria for safe ambulation following subarachnoid block. *Can Anaesth Soc J* 1978; 25(2): 133.

TABLE IV Laparoscopy epidural recovery time - minutes

	Mean	Range	S.D.
Mepivacaine 1.5%	218.3	385-125	46.5
Lidocaine 2%	180	279-93	36.7
Prilocaine 2%	210.6	251-141	30.5
Prilocaine 3%	236.7	307-152	36.5