Outpatient anesthesia with nalbuphine hydrochloride

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The author reports on the relative merits of nalbuphine hydrochloride (Narcan®) in a balanced anesthesia technique for outpatient surgery. The findings of a study of 100 patients are highlighted.

Nalbuphine hydrochloride is a relatively new agonist-antagonist drug structurally related to the potent narcotic, oxymorphone (Numorphan®), and the potent narcotic antagonist, naloxone (Narcan®). (Figure 1.) Nalbuphine has a potency equivalent to morphine sulphate and meperidine (10 mg morphine sulphate and 75 mg meperidine being equivalent to 20 mg nalbuphine),1 with an abuse potential which is less than that of codeine.

The major side effects of nalbuphine appear to be similar to those reported for the narcotic analgesics. Nalbuphine does not appear to affect cardiodynamics.2,8,4 When it is used in increasing dosages, respiratory depression reaches a ceiling effect, (approximately 30 mg/70 kg),5,8 unlike the reaction that occurs with morphine and meperidine that increase respiratory depression with increasing dosages.5 For these reasons, we will focus on the relative merits of nalbuphine in a balanced anesthesia technique for outpatient surgery.

Methods

In order for the investigators to familiarize themselves with nalbuphine, an open study was performed. The study was conducted on 100 fe-

male patients who were having laparoscopy and tubal ligation performed with an average hospital stay of 12-16 hours. Ninety percent of these patients were ASA Class I and 10% were ASA Class II. Ages ranged from 19-42 with a mean age of 30. Any patient with a prior history of drug abuse or dependence was eliminated as were patients who had received analgesics within 12 hours prior to surgery.

The patients were premedicated with hydroxyzine 1 mg/kg and atropine 0.4 mg IM one hour prior to surgery. Upon arrival in the operating room, each patient had a 20-gauge intravenous cannula placed in her left forearm; the cannula was connected to an infusion of lactated Ringer’s solution. Prior to induction, heart rate, respiratory rate, tidal volume, blood pressure and mean arterial pressure (the latter two being measured by the Dinamap™ 845) were monitored and documented.

After pretreatment with 3 mg of d-Tubocurare, induction was carried out with sodium thiopental 6 mg/kg, and succinylcholine 1.5 mg/kg followed by intubation of the trachea. Ventilation was controlled with these patients utilizing a ventimeter/ventilator with a rate of 10/minute at a tidal volume of 10 cc/kg body weight.

Nalbuphine 0.2 mg/kg was then administered while the anesthetist continually monitored the heart rate, blood pressure, and mean arterial pressure every two minutes. This monitoring was carried out for the duration of the procedure. Anes-
Anesthesia was maintained with nitrous oxide and oxygen at a ratio of 70:30 and a 0.1% succinylcholine drip for relaxation.

At the completion of the procedure, the succinylcholine drip total was tabulated and the patients were placed on 100% oxygen. Respiratory rate, tidal volume, vital capacity, and response to oral commands were then noted. If these proved to be adequate, the patients were then extubated and taken to the recovery room where heart rate, blood pressure, respiratory rate, tidal volume, vital capacity and response to oral commands were charted both initially and every half hour thereafter.

Subjective postoperative analgesia, as well as any side effects, were assessed two hours after the patients left the recovery room.

**Results**

Of the 100 patients anesthetized with nalbuphine as a supplement to nitrous oxide balanced anesthesia, successful anesthesia was accomplished with nalbuphine, nitrous oxide, thiopental, and succinylcholine drip. The average total dose of nalbuphine was 19.2 mg with the average surgical time being 45 minutes.

Respiratory parameters were measured on all patients as shown in Table 1. It is interesting to note that in the majority of the patients anesthetized, there were no major deviations in any of the measured parameters.

The slight elevation of blood pressure and mean arterial pressure at the beginning of the procedure in approximately 75% of the patients was noted. This, as seen in a vast majority of patients undergoing the identical surgery, could be attributed to the body position and to CO2 being introduced into the peritoneal cavity. However, at the end of the surgery, all of the cardiovascular parameters measured returned to their pre-incision values.

Postoperatively, all of the patients were interviewed before leaving the post-anesthesia recovery room (PARR) and approximately three hours later. The results of these interviews are shown in Table 2.

**Conclusion**

The results of this study seem to indicate that nalbuphine hydrochloride (Nubain®), when used as a supplement to balanced anesthesia, is an effective and safe analgesic for outpatient surgery. The dose of nalbuphine given in this particular study (0.2 mg/kg) appeared to be effective for minor outpatient procedures when discharge from the hospital on the same day is desirable.

Postoperative side effects with nalbuphine seem to be similar to that of other analgesics (Table 2). The one feature of nalbuphine that warrants further investigation is the moderate sedation patients felt when they received nalbuphine. Recovery room nurses must be alerted to the patient receiving nalbuphine in a balanced anesthesia technique because even though these patients will have all of their protective reflexes intact and are easily aroused, they will lie calmly

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**Figure 1**

Nubain® (nalbuphine HCl) was designed to incorporate important molecular features of the agonist analgesic Numorphan® (oxymorphone HCl) and the narcotic antagonist Narcan® (naloxone HCl).

![Chemical structures of Numorphan®, Narcan®, and Nubain®](image)

The chemical name of Nubain® is (−)-17-(cyclobutylmethyl)-4,5-~2-epoxy-morphinan-3,6~3,14-triol, hydrochloride.
and peacefully in their beds unless otherwise disturbed.

On longer and major surgeries, this investigator has found that using nalbuphine in conjunction with droperidol leads to a smoother recovery and decreases the likelihood of nausea and vomiting, so common in narcotic anesthesia.

In conclusion, nalbuphine is a good choice as a supplement in balanced anesthesia. With its cardiovascular stability, lack of marked respiratory depression, and low abuse potential, its usefulness in a daily anesthesia practice has its merits.

REFERENCES

Table 1

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<th>Preoperative</th>
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Table 2

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AUTHOR
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