A Comparison of Epidural 2-Chloroprocaine versus Lidocaine - with and without clonidine - in Ambulatory Knee Arthroscopy

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"وَ مَا أُوتِيتُمْ مِنَ الْعِلمِ إلاّ قَلِيلاً"

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List of Abbreviation

PAT : preanesthesia testing
ASA: American Society of Anesthesiologists
PKa: pH at which the amount of ionized and non-ionized drug are equal
GABA: gamma aminobutyric acid
NMDA: N-methyl D-aspartate
MAC: minimum alveolar concentration

LC: Locus coerulus

ICU: Intensive care unit

VO_2: oxygen consumption

2-CP: 2-chloroprocaine

CNS: central nervous system

EDTA: ethylene diamine-tetra acetic acid

UBF: uterine blood flow

FHR: fetal heart rate

PABA: para-aminobenzoic acid

FDA: Food and Drug Administration

BP: Blood pressure

HR: heart rate

PACU: postanesthesia care unit

PADSS: post-anesthetic discharge scoring system

SD: standard deviation

IV: intravenous

PCA: patient control anesthesia

LIST OF ERRORS

Page no	Error	Correct
٧	Line (24):syntetised	synthesized
٢١	Line (7): endotraccheal	endotracheal
٢٤	Line (10): noloxone	naloxone
٢٧	Line (5): Given as 50 ug doses, a dose of up to 150 ug	clonidine given in a dose 75 ug up to 150 ug
٦٥	Line (12): [Boehringer Ingelheim (NZ) Limited ; 10 ug / ml].	(10ug/ml) [Boehringer Ingelheim (NZ) Limited]
٦٥	Line (17): Group III	Group IV
٦٦	Line (16): sedated to sedated to	sedated to
٧٤	Line (12): Group I	Group IV
٨٢	Line (5): raid	rapid
٨٥	Line (24): throughput	throughout
٨٨	Line (25): deigned	designed
٩٦	Line (25): Group I	Group IV
الملخص العربى	Line (5): الألمز	الألم

INTRODUCTION

During the last two decades, a number of new anaesthetic, analgesic and adjuvant drugs, each with more rapid onset of action and shorter duration of action, have been developed. As a result, the range of techniques and surgical procedures which can be performed on an ambulatory or day-case basis has increased. The challenge of anesthesia for ambulatory patients is to provide for rapid return to street readiness with the most effective postoperative analgesia and minimal undesirable side effects. Regional anesthesia, with its selective local action and relatively simple equipment, offers an excellent anesthetic choice in an outpatient facility. In addition to limiting the anesthetized area to the surgical site, the common side effects of general anesthesia (e.g., nausea, vomiting, lethargy) are reduced, the risks and side effects of endotracheal intubation are minimized, patient recovery time may be decreased, and improved analgesia is provided in the postoperative period. [1,2]

A number of studies [3,4] have evaluated the efficacy of ambulatory regional anesthesia. Urmey et al [3] prospectively recorded data on ambulatory surgery patients at an orthopedic specialty hospital where regional anesthesia was the first-line standard care. Only 4.4% of patients who had regional anesthesia required admission compared with 12% of general anesthetics. Discharge times were similar for general, spinal, or epidural anesthesia (average of 3 hours); patients who had peripheral nerve blocks were discharged in approximately 2 hours. Failure of regional anesthesia, necessitating general anesthesia, occurred in only 1% of cases. The authors concluded that regional anesthesia in an ambulatory center is effective in all but a small percentage of patients. Osborne [4] evaluated outcome for 6000 consecutive procedures in a major public teaching hospital day surgery unit. Anesthesia-related complications were more frequent with general anesthesia (1:114) than with regional

anesthesia (1:180) or local anesthesia plus sedation (1:780). Recovery with regional or local anesthesia was significantly shorter than after general anesthesia.

Despite the potential advantages cited regional anesthesia should not be considered universally appropriate. Factors that contribute to a successful regional anesthetic include the appropriate selection of patients, anesthetic technique, and local anesthetic, use of sedative and hypnotic agents, and the skill of the anesthesiologist. Prior screening of patients through preanesthesia testing (PAT) clinics is very useful in determining the acceptability of patients for a regional anesthetic. Very young or excessively anxious patients may be poor candidates. Similarly, obese patients may present technical problems, especially for central neuraxial blocks. Patients of American Society of Anesthesiologists (ASA) physical status III or IV may be particularly good candidates for ambulatory regional anesthesia compared to general anesthesia, especially if their systemic diseases are medically stable.[1,2]

Arthroscopic procedures on the knee joint form a large proportion of outpatient surgical procedures. The surgery may be solely diagnostic, and in this situation may last less than 30 minutes. Therapeutic procedures (e.g., meniscectomy) may last 2 to 3 hours. The knee is innervated by L3, L4, and L5 nerve roots anteriorly and the first two sacral roots posteriorly. A number of different regional anesthetic techniques have been used for knee surgery. Randel [5] considered epidural anesthesia superior to spinal or general anesthesia for outpatient knee arthroscopy. Patel et al [6] noted favorable operating conditions and good postoperative analgesia with a 3-in-1 femoral nerve block, a lateral cutaneous nerve block of thigh, and 10 mL 0.25% bupivacaine as supplementary intra-articular anesthesia, if required. A variety of analgesic techniques have

been evaluated and advocated for managing postoperative pain after arthroscopic knee surgery. These techniques have largely focused on the use of intra-articular anesthetics, intra-articular opioids, and systemic nonsteroidal anti-inflammatory agents. Although studies have shown various degrees of success, intra-articular injections of local anesthetics and opioids are currently popular for postoperative analgesia. Intra-articular 0.25% bupivacaine, usually in doses of 20 mL, is associated with significantly improved early (1-6 hours) postoperative analgesia, and generally does not appear to be effectively maintained thereafter. [7,8] Conflicting results exist regarding the efficacy of intra-articular morphine with some studies revealing effective analgesia for up to 48 hours [9,10].

Outpatient regional techniques require some modification from standard inpatient procedures. Ideally, an outpatient regional technique should be rapid in onset and result in few if any acute or delayed complications (e.g., pneumothorax). The additional time needed to perform many regional blocks, as well as the time needed for the anesthetic to take effect, is a potential drawback when procedures are short and turnover between cases is rapid. Use of blocks that require more time than the procedure itself to perform should be limited to those situations where specifically indicated for medical reasons or the patient expresses a strong preference for a specific technique. Blocks that significantly impair the ability to ambulate and void should be tailored to the anticipated usual duration of surgery by appropriate selection of both local anesthetic agent and technique to minimize both recovery and discharge time. Prolonged analgesia from a block (e.g., foot, arm, or hand blocks) may be beneficial in some instances, particularly if the ability of the patient to perform various activities is not significantly impaired; however, prolonged anesthesia may provoke anxiety or be considered

unpleasant or irritating by many patients when it persists for many hours after hospital discharge and should be discussed with patients before instituting such a block [11].

Effective use of epidural local anesthesia requires an understanding of local anesthetic potency and duration and a realistic estimate of the length of the procedure. A variety of different agents are used for epidural anesthesia. Chloroprocaine, an amino-ester local anesthetic, is a short-acting agent that allows efficient matching of surgical procedure length and duration of epidural analgesia. It is available in 2% and 3% concentrations, with the latter preferable for surgical anesthesia [12].

HISTORICAL VIEW

Local anesthetics are drugs that produce reversible conduction blockade of impulses along central and peripheral nerve pathways after regional anesthesia. With progressive increase in concentrations of local anesthetics, the transmission of autonomic, somatic sensory, and somatic, motor impulses are interrupted, producing autonomic nervous system blockade, sensory anesthesia, and skeletal muscle paralysis in the area innervated by the affected nerve. Removal of the local anesthetic is followed by spontaneous and complete return of nerve conduction, with no evidence of structural damage to nerve fibers as result of the drug's effects [13].

Cocaine was introduced as the first local anesthetic in 1884 by Kollar for use in ophthalmology. Halsted recognized the ability of injected cocaine to interrupt nerve impulse conduction, leading to the introduction of peripheral nerve block anesthesia and spinal anesthesia. As an ester of benzoic acid, cocaine is present in large amounts in the leaves of *Erythroxylon coca*, a plant growing in the Anode mountains, where its cerebral-stimulaing qualities are well known. Another unique feature of cocaine is its ability to produce localized vasoconstriction, making it useful in rhinolarynglogic procedures and nasotracheal intubation to shrink the nasal mucosa. Abuse potential of cocaine limits its legitimate medical uses, whereas irritant properties of cocaine preclude its use for topical anesthesia for the cornea or any form of injection to produce anesthesia.

The first synthetic local anesthetic was the ester derivative procaine, introduced by Einhorn in 1905. Lidocaine was syntetised as an amide local anesthetic by Lofgren in 1943. It produces more rapid, intense, and long-lasting conduction blockade than procaine. Unlike procaine, lidocaine is effective topically and is a highly efficacious