Review Article

MINIMAL INVASIVE SURGERY UNDER SURFACE ANESTHESIA (INTRAURETHRAL) AN HISTORICAL REVIEW

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INTRODUCTION

In early nineteen century, majority of the surgeries were performed without anesthesia. In 1847 one year after William T.G. Morton published the efficacy of ether as general anesthetic, one third of painful operations were performed on un-anesthetised people. Thirty two percent of all major amputations were performed without anesthesia at Pennsylvania Hospital between 1853–1862. The surgeons of this era were reluctant to use various anesthetic drugs due to their complications without the availability of monitoring facilities. The pain "as essential part of life and necessary for healing and recovery" was a concept prevalent in 19th century[1].

Cocaine was first used by Carl Koller, in 1884 as topical anesthetic agent in eye, allowing adequate analgesia without lethal side effects of inhalation anesthesia[2]. This discovery of cocaine motivated all the surgeons especially urological surgeons to use it as intraurethral anesthesia. In this review I searched the evaluation of intraurethral (local/surface) anesthesia in urological surgeries.

MATERIAL AND METHODS

A review of literature was performed regarding surface/local anesthesia in the context of urological surgery. Research period was 1850 to the present. Pub med, med line, google search engine, and yahoo net commands were used to search for articles. Search commands were local or surface anesthesia, xylocaine, lidocaine, and anesthesia. More than 75 abstracts were reviewed and out of these 50 met criteria.

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RESULTS

There was dramatic increase of surgeries with the discovery of ether as an anesthetic agent in 1846. At Massachusetts General Hospital various types of surgeries were performed in about 16% of admitted patients during 1845-1846. This increased to 39.6% in 1846-1847. In the last decade of nineteen century, greater number of patients were candidate for anesthesia with the advent of cocaine as analgesic agent in 1884.[1,2] Urologists quickly embraced the use of local anesthesia and there was dramatic increase in number of urological surgeries.[1,2] Cocaine as intraurethral surface anesthesia was gradually replaced by safer local anesthetics such as lidocaine. There are conflicting reports of ideal quantity, duration, administration and efficacy of anesthetic agents.

COMMENTS

Cocaine has been isolated from coca leaves by chemists in Peru and Germany. Karl Koller's experiments with cocaine in Vienna led to the unveiling of local anesthetic effect for surgical procedures. Before 1884, physicians had limited choices in terms of anesthetics. Choices were general anesthetics, alcohol or no anesthesia.[1,2] Although cocaine was first used in the eye, urologists were quick to take its benefit as intraurethral anesthesia. Within months of publication of Koller's experiments, the urologists in the United States were performing surgeries using intraurethral, topical and local injection of cocaine solution.

In 1885, Dr. Fessenden Otis reported his successful use of intraurethral 2% cocaine solution as anesthetic in vesical stone and 4% solution for the treatment of urethral stricture.[3] Previous attempts of surgeries in these patients without anesthesia failed due to unbearable pain.
1n 1885, the New York medical journal published articles describing the use of cocaine in the treatment of phimosis, urethral spasm, urethral stricture, bladder calculi, vesical tenesmus and prepuce operations in children.[4,5] W.A. Hammond performed cocaine experiments on himself to establish its effects.[6] He himself injected cocaine and reported "exhilaration of spirits", Insomnia headaches, palpitations, and suffered a period of amnesia lasting several hours. He concluded that he suffered no horrible effects and failed to acquire the "So, Called Cocaine habit". Dr. J.B. Mattison, of Brooklyn reported observing cocaine addiction in five physicians and called the drug "most dangerous and destructive of the tissue".[6] Despite these warnings, cocaine continued to be used as local anesthetic in urological procedures. In 1895, a urologist of New York reported adverse effects of 10% cocaine solution on a patient in whom he performed internal urethrotomy. The patient lost consciousness, became tachycardic, and experienced cyanosis, pupilary dialatation, shallow respiration and muscle cramps. The patient was treated with whisky, bladder irrigation and injection of morhphine[7]. Surgical books in 1912 & 1921 recommended 2% Cocaine solutions.[8,9]

Use of cocaine became popular in Europe as well as in United Stated and various urological procedures were reported to be performed.[10, 11, 12]

By the beginning of 20th century, the adverse effects of cocaine were known by the medical community. The significance and side effects were widely debated.

Alexander Randall published a paper describing use of intraurethral anesthetics the urological surgeries.[13] Randall found that the local anesthetic in use were cocaine, novocain, procaine, apothesine, alypin. In his survey 10% of urologists routinely used cocaine, 30% Novocain, procain, alypin and sixty percent did not use any local anesthetics.[13] Randall's survey recorded 38 cases of severe intoxication and 6 deaths from intraurethral administration of anesthetic.
Doctor Senger and Zorgniotti[14] in 1954 conducted a survey, which showed 54% residents preffered intraurethral anesthesia as first choice, 26% believed only adequate lubrication and no anesthesia. Even in 1954 8% of respondents still used cocaine for intraurethral anesthesia.

As the 20th century progressed, urologists were more convinced in using xylocaine due to its rapid onset of action. In 1949 Haines and Grabstald from USA reported use of 2% xylocaine in 250 patients for various urological procedures ranging from cystoscopy to bladder fulgration.[15] Another study concluded that xylocaine as surface anesthesia was an effective method during various cystoscopic procedures avoiding need for general anesthesia.[16]

The use of intraurethral cocaine waned with the availability of lidocaine and other alternatives. By 1990s 2% lidocaine became commonly available, as safe intraurethral anesthetic. Numerous studies have been published using 2% lidocaine with lubricating agents in various procedures including rigid cystoscopy, flexible cystoscopy, transurethral painful procedures and urethral catheterization.

A meta analysis of prospective randomized controlled trials between 1950-2006 showed no additional efficacy of lidocaine gel, over water based lubrication.[17]

A few studies have been published in recent years using intraurethral anesthesia for invasive procedures like transurethral microwave thermotherapy (TUMT). Patients undergoing TUMT with intraurethral prostate injection of mepiracain required less intravenous analgesia and decreased treatment time.[18]

Birch *et al* examined systemic effects of lidocaine; 40 ml of 1% lidocaine was instilled into bladder of 11 patients and left intravescially for one hour in group A and for

two hours in group B. The study found a peak plasma concentration 30 times less than minimum, toxic level at 60-90 minutes.[19] Qnellett *et al* completed a similar study by using intraurethral lidocaine gel in 30 patients. Plasma concentration of lidocaine never exceeded 0.2 ug/ml.[20]
These studies and many others demonstrated the safety of intravesical and intraurethral use of lidocaine.

Urologist, have been debating over duration, efficacy and safety of intraurethral anesthesia for more than 100 years. Initially it was cocaine and now this is lidocaine.

CONCLUSION

Use of local anesthesia in surgical procedure started in 19th century. Intraurethral anesthesia was quickly accepted by urologists and this contributed to wide acceptance of local anesthesia by the medical community and this made a revolution in the practice of surgery. Intraurethral anesthesia continues to be used as effective and safe anesthesia in modern urology, however ideal method of its utilization varies.

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