

Ketamine and Midazolam Anesthesia in Surgical Operations: An Experience of Sierra Leone

Cerrahi İşlemlerde Ketamin ve Midazolam Anestezisi: Sierra Leone Deneyimi

Öz

Giriş: Ketamin yüksek dozda genel anestezi, düşük dozda analjezi için kullanılabilir. Bu çalışmada ketamin anestezisi altında ameliyat edilen 49 hastayı sunmayı amaçladık.

Gereç ve Yöntemler: Bu çalışmada, 10–16 Mart 2014 döneminde Sierra Leone Port Loko Devlet Hastanesi'nde Yeryüzü Doktorları gönüllü cerrahi ekibi tarafından ameliyat edilen 49 hastanın sonuçları bildirilmektedir. Tüm hastaların demografik özellikleri ve uygulanan cerrahi prosedürler kaydedildi. Tüm hastalar ketamin ve midazolam anestezisi altında ameliyat edildi.

Bulgular: Ortalama yaşları $36,8 \pm 17,8$ olan 5 kadın ve 44 erkek hasta ameliyat edildi. Bir hastada umbilikal herni, birinde epigastrik herni ve 35 hastada inguinal herni vardı. Umbilikal ve epigastrik hernilere primer tamir yapıldı. Inguinal herni 19 hastada sağ, 16 hastada sol taraftaydı. Yirmi sekiz hastada indirekt, 6 hastada direkt ve 1 hastada bilateral herni vardı. Hiçbir hastada obstrüksiyon veya strangulasyon görülmedi. Hernisi olan dört çocuk hastaya yüksek ligasyon uygulandı. Yetişkin yaş grubundaki 28 hastaya ağ örme ameliyatı ve 3 hastaya Bassini tamiri yapıldı. Dördünde sağ, dördünde sol tarafta olmak üzere dev hidroseli olan 8 hasta Winkelman yöntemiyle opere edildi. Bir hastaya testisteki kitle için orşiektomi uygulandı; 1 hastada inguinal bölgedeki tümör, 1 hastada boyundaki lipom ve 1 hastada sol labium majustaki kitle eksize edildi. Hiçbir hastada anestezi kaynaklı bir komplikasyon gelişmedi.

Sonuç: Düşük doz intravenöz ketamin ve midazolam ile sağlanabilecek güvenli ve etkili sedasyon, özellikle cerrahi anestezinin uygulanamadığı saha koşullarında gerçekleştirilecek cerrahi prosedürler için yararlıdır.

Anahtar Sözcükler: ketamin; cerrahi; herni; midazolam

Abstract

Introduction: Ketamine can be used in high doses for general anesthesia and in low doses for analgesia. In this study, we aimed to present 49 patients operated under ketalar anesthesia.

Materials and Methods: This study reports the results of 49 patients who were operated by Doctors Worldwide's voluntary surgical team in the Port Loko Government Hospital, Sierra Leone, between 10 and 16 March 2014. The demographic characteristics of all patients and the surgical procedures performed were recorded. All patients were operated under ketamine and midazolam anesthesia.

Results: 5 female and 44 male patients whose mean age was 36.8 ± 17.8 were operated. 1 patient had umbilical, 1 had epigastric, and 35 had giant inguinal hernia. Umbilical and epigastric hernias underwent primary repair. Inguinal hernias were right-sided in 19 patients, and left-sided in 16. Twenty-eight patients had indirect hernia, while 6 had direct and 1 had bilateral hernia. No obstruction or strangulation was observed in any of the patients. Four pediatric patients with hernia underwent high ligation. In the adult age group, 28 patients underwent darn repair and 3 Bassini repair. Of the 8 patients with giant hydroceles, 4 had it on the right side and 4 on the left, and all of them were operated by Winkelman's technique. One patient underwent orchiectomy for a right-sided testicular mass; 1 excision of an inguinal tumor; 1 excision of a lipoma in the neck, and 1 excision of a solid mass in the left labium majus. No anesthesia-related complication developed in any of the patients.

Conclusion: Safe and effective sedation achievable by intravenous administration of low-dose ketamine and midazolam is particularly useful for surgical procedures to be performed in field conditions where general anesthesia is not applicable.

Keywords: ketamine; surgery; hernia repair; midazolam

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INTRODUCTION

Ketamine is a medication used mainly to induce and maintain anesthesia. It is also used for sedation in intensive care, as an analgesic and antidepressant, and to treat bronchospasm and complex regional pain syndrome. Ketamine is administered in high doses in general anesthesia and in lower doses for analgesia. It is a non-selective antagonist of supraspinal N-methyl-D aspartate receptors. Inhibition of these receptors leads to reduced neuronal signaling, which may explain how ketamine induces analgesia. In addition, ketamine also acts at numerous other sites including opioid receptors and pain receptors in the spinal cord (1–3). As a potent analgesic it can be used in sub-anesthetic doses to relieve acute pain; however, its psychotropic properties should be taken into consideration. In addition to its analgesic potential, it stimulates hemodynamic changes and causes minimal cardiorespiratory depression when administered solely. While anxiolytic in low doses, its high-dose administration may lead to anxiogenic states unless it is used without an hypnotic agent (4). Combination of low-dose ketamine with midazolam provides balanced sedation and analgesia without affecting the sedation level (4). Ketamine is usually used intravenously in hernia repair as well as cutaneous interventions in general surgery, dilatation and curettage in gynecology, and hydrocele repair in urology (1,5).

Doctors Worldwide (DWW) is a non-governmental organization established by a group of doctors in 2000. Since 2000, the volunteers of the ever-expanding DWW have been providing medical and humanitarian aid and education for asylum seekers and victims of disasters like war, famine, poverty, aridity, epidemics and earthquakes, also contributing to the improvement of preventive health services and physical development of rural areas in more than forty countries in four continents.

In this study, we aimed to present 49 patients operated under ketalar anesthesia by the DWW surgical team in Sierra Leone.

MATERIALS AND METHODS

The data of the 49 patients who had been operated by the voluntary surgical team of DWW in the Port

Loko Government Hospital, Sierra Leone, between 10 and 16 March 2014 were evaluated. The demographic characteristics of all patients (Table 1) and the surgical procedures performed (Table 2) were recorded. Operated hernias were classified based on their type and conditions such as reducibility, strangulation, obstruction; groin masses were assessed with respect to their localization. All patients were operated under ketamine anesthesia. They received 0.07 mg/kg of intravenous midazolam followed by 2 mg/kg of intravenous ketamine. Vital signs were recorded at regular intervals.

RESULTS

5 female and 44 male patients whose mean age was 36.8 ± 17.8 years were operated (Table 1). One patient had umbilical (2%), 1 had epigastric (2%), and 35 had giant inguinal hernia (71.4%). Umbilical and epigastric hernias underwent primary repair. Inguinal hernias were right-sided in 19 patients, and left-sided in 16. Twenty-eight patients had indirect hernia, while 6 had direct and 1 had bilateral hernia. No obstruction or strangulation was observed in any of the patients. Four pediatric patients with hernia underwent high ligation. In the adult age group, 28 patients underwent darn repair and 3 Bassini repair. Of the eight patients with giant hydroceles, 4 had it on the right side and 4 on the left, and all of them were operated by Winkelmann's technique. One patient underwent orchiectomy for a right-sided testicular mass; 1 excision of an inguinal tumor; 1 excision of a lipoma in the neck, and 1 excision of a solid mass in the left *labium majus* (Table 2). No anesthesia-related complication developed in any of the patients.

DISCUSSION

People are not born into equal conditions of opportunity. While in some regions people live well in prosperity, utilizing ultimate technology, other regions host people who suffer in desperation. For instance, more than two billion people still do not have access to surgical treatment today. The poorest, most underdeveloped 25 countries of the world are located in Africa; and Sierra Leone in West Africa is one of them, with a population of 6 million.

Table 1. Patient characteristics

	Patients (N=49)
Age	36.8±17.8
Female	5 (10.2%)
Male	44 (89.8%)

Table 2. Surgical procedures

Procedure	Patient number	%
Inguinal hernia repair	35	71.6
Winkelmann procedure	8	16.4
Umbilical hernia repair	1	2
Epigastric hernia repair	1	2
Orchiectomy	1	2
Excision of an inguinal tumor	1	2
Excision of lipoma in the neck	1	2
Excision of a solid mass in the left <i>labium majus</i>	1	2
TOTAL	49	100

Surgically treatable diseases become serious public health problems in poor countries (6). Surgical operations should be prioritized while planning humanitarian aid programs for countries with limited resources for health expenditures (7). In such countries, surgical services can be improved by teaching the local health-care professionals about the simpler and cheaper procedures that can be applied alternatively (8). It is unfortunate that most deaths in Sierra Leone occur due to the circumstances of poverty that hinder access to surgical treatment and equipment; and strategies aimed at overcoming the current financial restrictions by application to such alternatives may help relieve the burden on the healthcare system in this region (9–13).

Anesthesiology utilizes advanced technology in developed countries. In two of the tertiary care hospitals in Freetown, Sierra Leone, anesthesiology nurses are managed by an anesthesiology specialist. Although advanced anesthesiology devices are certainly much safer in patient care, their procurement, maintenance and repair are also more expensive (1). In socioeconomically undeveloped countries such as Sierra Leone, financial resources allocated to medical services are extremely limited; and use of ketamine anesthesia in operations for hernia treatment or hydrocele repair can reduce the expenses of the surgery. Our experience and study indicate that this type of anesthesia is

safe in the surgical treatment of such conditions.

Benzodiazepines and low-dose remifentanyl or other narcotic analgesics that have anxiolytic, amnesic, and sedative effects are frequently used to improve patient comfort (14,15). Dissociative sedation achieved by the combined use of midazolam and ketamine is an alternative to the conventional sedation methods. This combination is well tolerated and safe, causing less side effects than other combinations do (4,14–16).

Ketamine is a potent analgesic, and its analgesic effects last even after the sedation wanes. When ketamine and midazolam are administered in combination, a balanced sedation and analgesia is achieved (2,4,15). This dual combination is one of the best and safest, with respect to the final sedation and analgesia level (2,11). At the same time, however, ketamine anesthesia frequently causes hallucination. When used in combination, both ketamine and midazolam should be used in low doses due to midazolam's additive hypnotic effect (15,17,18). Ketamine inhibits catecholamine uptake and thus causes a mild to moderate rise in blood pressure, heart rate, and cardiac output. It is also contraindicated in patients with severe coronary artery disease, uncontrolled hypertension, increased intracranial pressure, and paranoid psychosis. Nevertheless, the unwanted adverse effects can be minimized by low-dose administration (17,18). None of our patients developed any anesthesia-related complications, such as the cardiorespiratory side effects, dysphoria, hallucinations or nightmares seen in midazolam/narcotic sedation.

This study indicates that a low-dose combination of intravenous ketamine and midazolam provides effective and apparently safe procedural sedation and analgesia.

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