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An Evaluation of the Approach of Orthopaedic Surgeons to Local Anaesthetic Toxicity

Lokal Anestezik Toksisitesinde Ortopedi Hekimlerinin Yaklaşımının Değerlendirilmesi

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ABSTRACT

Aim: To review the knowledge of orthopaedic surgeons related to the diagnosis, treatment and prevention of local anaesthetic systemic toxicity (LAST) and to raise awareness related to this subject.

Material and Method: A 16-item questionnaire was applied to orthopaedic surgeons of different academic levels in different hospitals in Turkey. The items sought to questioned demographic information, general knowledge related to local anaesthetic drugs, general knowledge related to toxicity and current treatment options.

Results: The study included a total of 172 orthopaedic surgeons in Turkey, of which 18.6% were orthopaedic residents, 51.7% orthopaedic and traumatology specialists, and 29.7% faculty members. Tenure in the orthopaedic area was determined to be >10 years in 45.3% of the participants. Local anaesthetic was seen to be used most in the operating theatre, followed by the Emergency Department, polyclinic intervention rooms, and on the wards. Of the total participants, 59.6% stated that they had never heard of the use of lipids in the treatment of LAST, 29.8% had heard of it but did not use it and 5.3% knew about the manner and area of use of lipid treatments.
Conclusion: Awareness of physicians about LAST and preparedness for complications can ensure safer use of these local anaesthetics.

Key Words: Local Anaesthetic Systemic Toxicity, Intravenous Lipid Solution, Ortho-paedic Surgery

ÖZ

Amaç: Ortopedi hekimlerinin lokal anestezik toksisitesi sendromu (LATS) tanı, tedavi ve önlemleri ile ilgili bilgilerini gözden geçirerek bu konu ile ilgili farkındalığın artırılması amaçlanmıştır.

Gereç- Yöntem: Türkiye'de farklı hastanelerde ve farklı akademik seviyede olan ortopedi hekimlerine demografik bilgileri, lokal anestezik ilaçlar ile ilgili genel bilgileri, toksisite ile ilgili genel bilgi ve güncel tedavi seçeneklerini sorgulayan 16 soruluk anketi cevaplamaları istendi.

Bulgular: Toplamda 172 ortopedi hekiminin (%18,6'sı ortopedi asistanı, %51,7'si ortopedi ve travmatoloji uzmanı, %29,7'si öğretim üyesi) katıldığı çalışmada hekimlerin %45,3'ü 10 yıldan fazla süredir ortopedi alanında çalışmakta olduğu görüldü. Lokal anestezik kullanım yerleri açısından en sık ameliyathane, daha sonra acil servis, poliklinik müdahale odası ve servis olarak sıralandığı tespit edild. LATS tedavisinde lipid kullanımı ile ilgili çalışmaya katılanların %59,6'sı lipid kullanımını daha önce hiç duymadıklarını, %29,8'i daha önce duyduklarını ama anımsamadıklarını, %5,3'ü lipid tedavisinin kullanım alanı ve şeklini bildiklerini belirtmiştir.

Sonuç: LATS konusunda hekimlerin bilinçli olması ve bu komplikasyon konusunda hazırlıklı olmaları ile lokal anesteziklerin daha güvenli kullanımları sağlanabilir.

Anahtar Kelimeler: Lokal Anestezi Toksisite Sendromu, İntravenöz Lipid Solüsyonu, Ortopedik Cerrahi

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INTRODUCTION

Local anaesthetic drugs are often used in daily practice, especially by surgical branch physicians. Complications related to local anaesthesia use are observed in daily practice. One of these complications is local anaesthetic systemic toxicity (LAST), which has a mortal course if not diagnosed early and appropriate interventions are not made. The first symptoms of LAST may be perioral numbness, a metallic taste in the mouth, lisping speech and diplopia. Sometimes it may start with excitation findings of the central nervous system (CNS) such as convulsion, agitation or confusion and with progression in the CNS, depressive symptoms may be seen, such as coma, apnea and mental depression. Generally with CNS symptoms there may be concomitant hyperdynamic findings in the cardiovascular system such as hypertension and tachyarrythmia or cardiac depression symptoms such as hypotension, bradyarrythmia and asystole [1,2].

The American Regional Anaesthesia and Pain Association (ASRA) held the first conference related to LAST in 2001. At that time, the first clinical experiences related to levo-enantiomers of ropivacaine and bupivacaine were discussed. The first guidelines related to LAST were published by the Association of Anaesthetists of Great Britain and Ireland, and these guidelines were later revised in 2010 [3]. In addition, laboratory experiments and the results related to the use of lipid emulsion as an antidote in LAST have also been discussed. In a second panel related to LAST in 2008, the diagnosis of LAST, preventative treatment and associated approaches were discussed [4, 5]. Despite precautions taken in respect of use of the correct technique and toxicity, LAST may develop, and therefore all physicians who use local anaesthetic must be knowledgeable and prepared on the subject of LAST [6].

The majority of surgical procedures undertaken by orthopaedists are performed in the operating theatre. Most procedures performed under local anaesthesia are in the Emergency Department or polyclinic intervention rooms. When using local anaesthesia in these surgical interventions applied outside the operating theatre, it is important in respect of patient safety that the physician knows the early and late symptoms of LAST and can apply the appropriate treatment options without any loss of time if LAST should develop.

There are survey studies in literature related to LAST in general and in various specialist areas, but to the best of our knowledge there has been no previous study conducted on orthopedists. The aim of this study was to review the knowledge related to LAST and its treatment of physicians in all stages of training in orthopaedic and traumatology clinics, where local anaesthesia drugs are widely used in daily practice, and to raise awareness of this important subject

MATERIAL- METHOD

Approval for the study was granted by the Clinical Research Ethics Committee of Kahramanmaraş Sütçü İmam University Medical Faculty (decision no: 2018/18-392). Then a questionnaire was sent by e-mail to orthopedists in different hospitals in Turkey. The questionnaire comprised 16 items concerning the demographic data of the participants, familiarity with the use of local anaesthetics, the effect mechanism of local anaesthetic, classification, toxicity of local anaesthetics and treatments. The questionnaire items were prepared by revising the questions used in the studies by Karasu et al and Öksüz et al [7, 8].

Statistical analysis

The data obtained in the study were analysed statistically using SPSS for Windows vn 22.0 (IBM Corporation, Armonk, NY, USA). Numerical variables were stated as mean ± standard deviation (SD) values and categorical variables as number (n) and percentage (%). A value of $p<0.05$ was accepted as statistically significant.

RESULTS

Fully completed responses to the questionnaire were obtained from a total of 172 orthopaedic surgeons, comprising 18.6% orthopaedic residents, 51.7% orthopaedic and traumatology specialists, and 29.7% faculty members, with a mean age of 37.42±5.45 years (Figure 1). Tenure in the orthopaedic area was determined as >10 years in 45.3% of the participants (Figure 2).

Of the total participants, 62.2% stated that they

had received no training related to local anaesthetics, and 28.5% reported having received training. Local anaesthetic was seen to be used most in the operating theatre, followed by the Emergency Department, polyclinic intervention rooms, and on the wards.

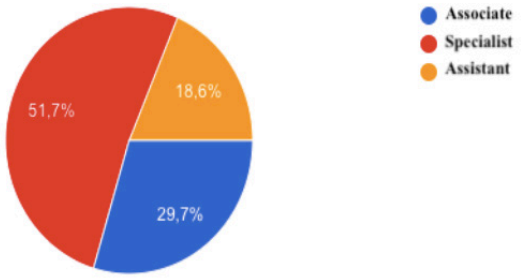

Figure 1. The level of the orthopedists participating in the study.

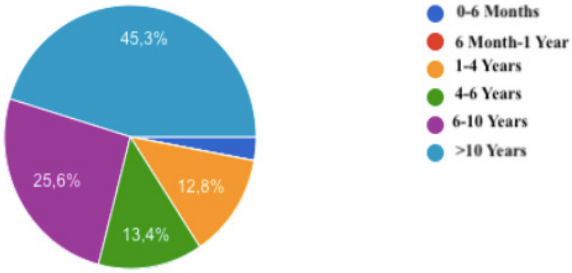

Figure 2. Duration of working in the field of orthopaedics and traumatology of the orthopedists participating in the study

The application of local anaesthesia by the subcutaneous/intramuscular route was reported by 69% of the participants. LAST had not been previously encountered by 55.6% of the orthopedists, and 28.7% reported that they had encountered LAST. In response to the question about the use of lipids in LAST treatment, 59.6% stated that they had never heard of the use of lipids in the treatment of LAST, 29.8% had heard of it but did not use it and 5.3% knew about the manner and area of use of lipid treatment.

In response to the question about what precautions should be taken to prevent LAST, 88.2% of the respondents stated the use of the appropriate dose, 29% stated monitorisation of the patient before the application of local anaesthetic and 21.3% stated the application of the intermittent injection method.

It was seen that 79.1% of the orthopedists did not know whether or not there was 20% lipid solution available in the institution where they worked, 9.9% reported that it was available and 11% stated that it was not (Figure 3).

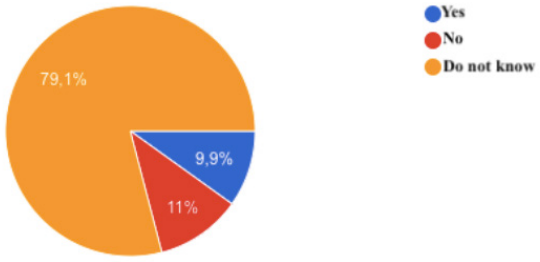

Figure 3. Responses of the orthopedists to the question of whether or not 20% lipid solution was available in the institution where they worked

DISCUSSION

The results of this questionnaire study applied to orthopedists demonstrated that the orthopedists had general knowledge about local anaesthetics because Orthopaedics and Traumatology is a department where local anaesthetics are often used, but the training given related to current approaches to LAST was seen to be insufficient. In addition, the respondents were not seen to be up-to-date with information about lipid solution, which has been shown to be effective in LAST treatment and is recommended to be available in units where local anaesthesia is applied.

When it is considered that surgical interventions are made both in the operating theatre and under Emergency Department conditions, local anaesthetics are often used in orthopaedic daily practice. The units where local anaesthetics were applied most often were reported by the orthopedists in the study to be the operating theatre and the Emergency Department. When operating theatre conditions are considered, the application of local anaesthesia can be made more safely.

The knowledge of the orthopedists in this study was not seen to be sufficient in respect of local anaesthetic doses, complications, contra-indications and side-effects. Especially in patients where a high dose of local anesthesia is used, the application of the local anaesthesia must be made taking into consideration comorbidities of the patient

and the maximum dose of the drug being used. A high volume of local anaesthetic is sometimes used in blocks applied for surgical interventions made to soft tissue, especially in the Emergency Department, and therefore attention must be paid to local anaesthetic doses. When all these are taken into consideration, it can be concluded that orthopaedic physicians should participate in current training programs related to local anaesthetics and LAST.

Clinical symptoms of LAST may be in the form of bradycardia/hypotension, arrythmia, impaired communication, cardiac arrest, loss of consciousness, agitation or seizures [9]. The properties of the local anaesthetic used are significant in the development of LAST. Of the local anaesthetics most widely used, bupivacaine is the drug with the most cardiotoxic effect. It is an amide group local anaesthetic with a long-lasting effect, but this increases the risk of toxicity. Compared with lidocaine, there is a 4-fold greater risk of toxicity and there may be a dose-related expansion of QRS on ECG and ventricular fibrillation [10, 11]. The use of bupivacaine in pregnant patients has been shown to increase the risk of cardiotoxicity because of the deceleration of venous return, the effect of progesterone and hypoproteinemia [12]. In the current study, in terms of preference, the use of bupivacaine was in third place (29.7%) after prilocaine (72.1%) and lidocaine (48.3%).

Of the participants in the study, 55.6% reported that they had never previously encountered LAST, and 28.7% had encountered LAST. The early stage symptoms most frequently seen were tachycardia, allergic reactions and a metallic taste on the tongue. In cases in literature, CNS symptoms only have been reported in 43%, cardiovascular symptoms only in 24%, and the two together in 23%. The most common cardiovascular symptoms have been reported to be arrythmia, transmission blocks and cardiac arrest while the most common CNS symptoms reported have been seizure and loss of consciousness [13].

In the questionnaire of this study, questions were asked to determine what was known about the use of 20% intravenous lipid solution (IVLS) in patients developing LAST, and 59.6% of the respondents stated that they had never heard of the use of IVLS. New guidelines on LAST treatment are still being prepared and updated. IVLS treatment was a part of the resucitation guideline for LAST treatment, published in 2007, and hospitals have been recommended to use these guidelines [14].

The results of the questionnaire determined that 79.1% of the respondents did not know whether or not 20% lipid solution was available in the hospital where they worked. In the most recent case reports in literature and in the guidelines it has been stated that IVLS treatment should be initiated as soon as symptoms of toxicity are determined as arrythmia, seizure and clinical symptoms can deteriorate very quickly [15]. In addition, the airway of the patient must be made safe during this time. It is of great importance that IVLS treatment is started before local anaesthetic plasma concentration increases. Therefore, in all units where local anaesthesia is used, such as the operating theatre, Emergency Department and surgical intervention rooms, it is important that 20% lipid solution is available and that all personnel working in the unit are provided with up-to-date training on the diagnosis, treatment and prevention of LAST.

CONCLUSION

Local anaesthetics are drugs that are often used in daily practice by surgical branch physicians in particular. Although LAST is not frequently seen, because of the potentially high mortality rates, it is important that orthopedists, who often use local anaesthetic drugs in daily practice, have up-to-date knowledge of doses, side-effects, symptoms of toxicity, diagnosis and treatment options and precautions to be taken. Physicians must be aware of LAST and prepared for complications, thereby ensuring safer use of these local anaesthetics.

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