



ARAŞTIRMA / RESEARCH

Evaluation of awake burr hole drainage for chronic subdural hematoma in geriatric patients: a retrospective analysis of 3 years

Kronik subdural hematomu olan ileri yaş hastalarda uyanık burr hole drenajın değerlendirilmesi: üç yıllık bir retrospektif analiz

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Abstract

Purpose: The goal of this research was to evaluate the effectiveness of burr hole drainage under local anesthesia in geriatric patients with chronic subdural hematoma.

Material and Methods: This retrospective study involved 21 geriatric patients with chronic subdural hematoma who applied to the department of neurosurgery in an education and research hospital between 2011 and 2014. Sedoanalgesia was performed on 21 patients, then awake burr hole drainage was performed after scalp and periosteal local anesthesia with bupivacaine HCl 5mg/ml (Marcaine %0,5enj. Astrazeneca). Cranial motor perforator was used for burr hole trepanation. Age, sex, trauma history, examination findings, site of the pathology, systemic disease, ASA risk, glasgow coma scale, modified rankin scale, mortality and morbidity were evaluated.

Results: The youngest patient was 68-year-old, the oldest was 90-year-old. The average age was 72.9 years. Eleven of the cases were male and 10 were female. Head trauma was the etiology in 20 cases. 2 burr hole drainages were performed in 18 cases and 1 burr hole drainage was performed in 3 cases under local anesthesia. 3 cases were re-operated. No mortality was seen in the early post-operative period. Cases were kept in the intensive care unit for 1 day. The average hospital stay was 7 days.

Conclusion: Surgical interventions under local anesthesia in geriatric patients with chronic subdural hematoma can provide short operation time, early mobilization, early oral intake, avoidance of possible general anesthesia complications. Herewith, this intervention decrease mortality and morbidity in this age group.

Key words: Burr hole drainage, subdural hematoma

Öz

Amaç: Bu araştırmanın amacı kronik subdural hematomu bulunan ileri yaş hastalarda lokal anestezi altında burr hole drenajın etkinliğini değerlendirmektir.

Gereç ve Yöntem: Bu retrospektif çalışma 2011-2014 yılları arasında bir eğitim ve araştırma hastanesinin beyin cerrahisi kliniğinde kronik subdural hematoma nedeniyle değerlendirilen 21 ileri yaşlı hastayı içermektedir. Sedoanaljezi 21 hastaya uygulandı. Sonrasında bupivacaine HCl 5mg/ml (Marcaine %0,5enj. Astrazeneca) ile yapılan scalp ve periosteal lokal anesteziyi takiben hastalara uyanık burr hole drenaj uygulandı. Burr hole açılırken kranial motor perforatör kullanıldı. Yaş, cinsiyet, travma hikayesi, fizik muayene bulguları, patolojinin yeri, sistemik hastalık, ASA, glasgow koma skalası, modifiye rankin skalası, mortalite ve morbidite değerlendirildi.

Bulgular: En genç hasta 68, en yaşlı hasta 90 yaşındaydı. Ortalama yaş 72.9' du. 11 hasta erkek, 10 hasta bayandı. 20 hastada etyoloji kafa travmasıydı. 18 hastada 2 burr hole ile drenaj, 3 hastada tek burr hole ile drenaj lokal anestezi altında uygulandı. 3 olgu tekrar opere edildi. Erken postoperatif periyotta mortalite görülmedi. Olgular yoğun bakım ünitesinde 1 gün tutuldular. Ortalama hastanede kalma süresi 7 gündü.

Sonuç: Kronik subdural hematoma olan ileri yaş hastalarda lokal anestezi altında yapılan cerrahi girişim kısa operasyon zamanı, erken mobilizasyon, erken oral alım, genel anestezinin olası risklerinden kaçınmayı sağlar. Bu sebeple, yöntem bu yaş grubunda mortalite ve morbiditeyi azaltır.

Anahtar kelimeler: Burr hole drenaj, subdural hematoma

INTRODUCTION

Chronic subdural hematoma (CSDH) is the most common type of hematoma in 65-years-old patients and older cases that have suffered head trauma. The incidence for this age group is 1-58/100000. Parenchymal atrophy of the brain occurs with age^{1,2}. The subdural area expands with parenchymal atrophy, thus the bridging veins in the subdural space become fragile. For this reason, tearing of these veins might occur even after a minor head trauma and patients might apply to the emergency service with neurologic findings and headache after a certain period of time³.

Generally, CSDH treatment involves emptying the hematoma from 1 or 2 operated burr holes, washing the subdural area and inserting a drain. Since most of the cases are over 65 years of age and many have chronic diseases and a history of anticoagulant use, surgery and anesthesia carry great risks¹.

In this study, we evaluated 21 geriatric patients in our neurosurgery department on whom awake burr hole drainage was performed under local anesthesia and sedation, within the past 3 years.

MATERIALS AND METHODS

Study setting and design

The study group was composed of 21 geriatric patients with CSDH who applied to the Department of Neurosurgery in Elazig Education and Research Hospital, Elazig, Turkey between 2011 and 2014. Age, sex, trauma history, examination findings, the site of the pathology, systemic disease, ASA risk rating, mortality and morbidity were evaluated. After their neurological and radiological examinations, patients were evaluated by an anesthesiologist and were consulted to the internist and cardiologist. The trial was approved by local ethical committee and informed consent was sought from the patients before the surgical procedure.

Data collection

Neurological status was evaluated by the Glasgow Coma Scale (GCS) and the modified Rankin Scale at three time points: before suffering from CSDH (based on interview with the patients family), on admission to our department, at the time of discharge. The Glasgow Coma Scale (GCS) was performed to determine the patient's level of

consciousness. The scale is composed of three tests: eye, verbal and motor responses. The three values separately as well as their sum are considered. The lowest possible GCS (the sum) is 3 (deep coma or death), while the highest is 15 (fully awake person). The MRS is a 7-point scale that has been used to measure disability after stroke and traumatic brain injury. A score of 0 indicates no symptoms at all and a score of 6 indicates death.

Operations were delayed in patients who were using anticoagulant drugs and who did not need an urgent operation, and their prothrombin times and international normalized ratio (INR) examinations were followed. The cases who needed urgent intervention were taken into surgery with the aid of a thrombocyte suspension and vitamin K. The cases were taken into the operating room and followed for their tension and oxygen saturation. Sedo-analgesia was performed at the proper dose for each patient with a mixture of fentanyl and midazolam, taking into consideration the level of consciousness, age, ejection fraction, and oxygen saturation of the patients. Patients were given 5lt/mn oxygen by mask. After sedation, the head was shaved on the appropriate side and the surgical side of the head was placed upwards and fixed by plaster. The scalp and periosteum were then anaesthetized with bupivacaine HCl 5mg/ml (Marcaïne %0,5enj. Astra Zeneca).

None of the cases was intubated. A nailed head holder was not used with any of the patients in order to prevent possible complications in head stabilization. Two surgeons participated in the operation. The second surgeon helped to keep the head stable in the burr hole process. Cranial motor perforator was used for burr hole trepanation. Brain tomography (CT) of the operated cases were performed at the 1st post-operative day and anticoagulant treatment was started again in appropriate patients.

Statistics

Data were analyzed using word excel and SPSS 11 for windows. Independent samples T test was used for inter-group comparison. The p value of <0.05 was taken as statistically significant difference. We use descriptive statistics when calculating the patients data as percent of average.

RESULTS

The youngest patient was 68 years old, the oldest was 90 and the average age was 72.9. Eleven of the cases were male and 10 were female. Etiology of the head trauma was identified in 20 cases. 1 case did not have a head trauma history but had an operation history due to hip fracture and this patient was using

anticoagulant. 14 cases stated that they had head trauma approximately 1 month ago, 5 cases had head trauma 20 days ago and 1 case had head trauma 6 months ago. 9 cases had hypertension and diabetes, 9 had coronary artery disease and hypertension and 2 suffered from dementia (Table 1).

Table 1: Clinical characteristics and symptoms of 21 patients with CSH

Average Age	72.9 (68-90)
Sex	Male: 11 Female: 10
Comorbid Disease	
	Hypertension: 9
	Coronary artery disease: 9
	Dementia: 2
	Diabetes mellitus: 9
Symptoms	
	Headache: 11
	Hemiparesis: 8
	Dysarthria: 3
	Vertigo: 8
	Loss-of Consciousness:10

Routine examinations of all the cases were performed in consultation with a cardiologist and internist before the operation. According to the anesthesia risk evaluation scale, 15 cases were ASA 3 and 6 cases were ASA 4 – high risk. A neurosurgeon was consulted due to dysphasia and hemiparesis in 3 cases, hemiparesis and loss of consciousness in 10 cases and hemiparesis in 8 cases.

CSDH presented in the right parietooccipital in 1 case, in the right frontal in 1 case, in the right fronto-parietal in 9 cases, in the left frontotemporoparietal in 1 case, in the left frontoparietal in 8 cases and in bilateral frontoparietal in 1 case. Two burr hole drainages were performed on 18 cases and 1 burr hole drainage was performed on 3 cases under local anesthesia. Average surgery time was between 30 and 45 minutes. The cases were kept in the intensive care unit for 1 day. Brain CT was performed on the 1st post-operative day and the drainages were removed on the 2nd post-operative day.

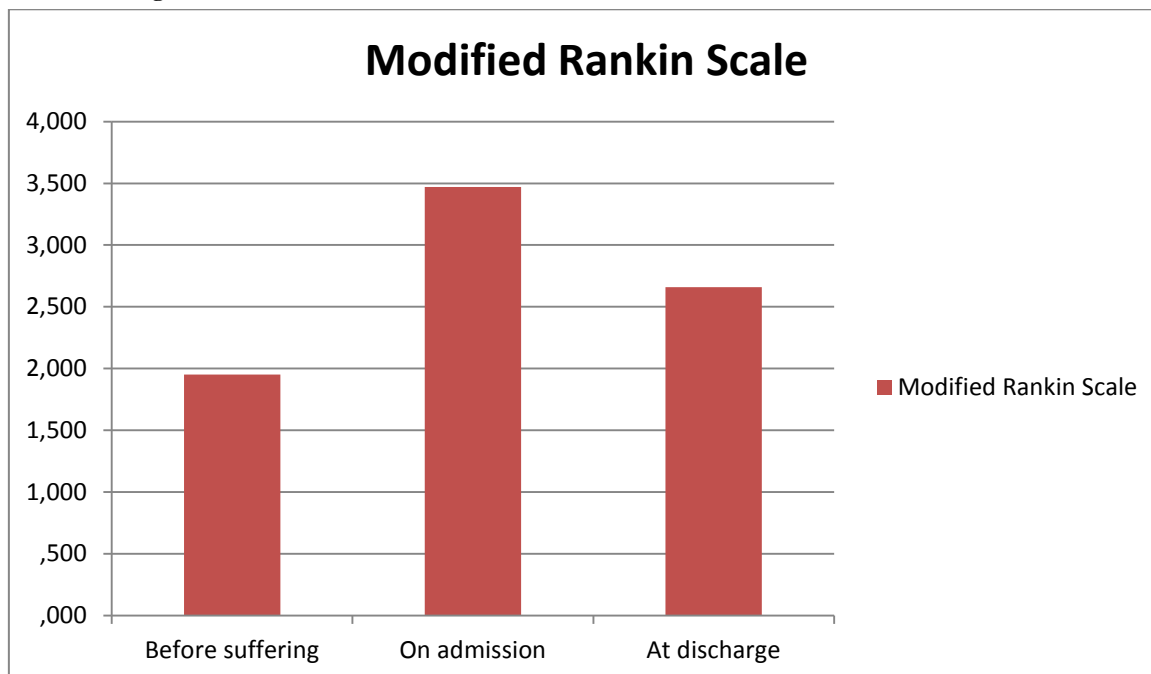
Postoperative complications occurred in 4 cases, including recurrence of CSDH in 3 cases,

pneumocephalia in 1 case. Average hospitalization duration was 7 days.

Before suffering from CSDH 2 patients had a score below 12 on the GCS, 5 patients had 13 score, 6 patients had 14 score and 8 patients had 15 score (based on interview with the patients family). On admission to our department 5 patients had a score below 12 on GCS, 5 patients had 13 score, 7 patients had 14 score and 4 patients had 15 score. After surgery, 2 patients had a score below 12 on the GCS, 4 patient had 13 score, 7 patients had 14 score, 8 patients had 15 score.

Before suffering from CSDH 8 patients had 1 mRS score, 8 patients had 2 mRS score, 3 patients had 3 mRS score, 2 patients had 4 mRS score (based on interview with the patients family). On admission to our department 10 patients had 4 mRS score, 2 patients had 5 mRS score, 5 patients had 3 mRS score, 4 patients had 2 mRS score. After surgery, 3 patients had 4 mRS score, 1 patient had 5 mRS score, 5 patients had 3 mRS score, 12 patients had 2 mRS score. After surgery, mean neurological status of the patients was significantly improved ($p < 0.05$) (Table 2).

Table 2. Neurological status as evaluated by modified Rankin Scale before the event, on admission to hospital and at discharge.



DISCUSSION

CSDH was defined by Virchow for the first time in 1845. CSDH that occurs at the 2nd or 3rd week after head trauma is mostly seen in patients age 60 and above. In previous study, the average age of incidence has been reported as 635. Although CSDH might remain limited and might not cause a neurologic finding in some patients, in others CSDH can repress the parenchyma and push the midline structures, thus it can cause a fatal herniation⁵.

In most cases the etiology of CSDH is thought to be head trauma. Though rare, tumor metastases to the subdural distance, aneurysmal and/or arterial bleeding, dural arteriovenous malformations, substance-alcohol addiction, coagulation disorders and infections might also cause CSDH^{6,7}.

The pathophysiology shows that bleeding starts in the bridging veins under the 1st plate of the dura mater due to the direct effect of the trauma in patients who have parenchymal atrophy after head trauma, especially those 65 and older, or those patients who have cranial hypotension. The capsule of CSDH caused by inflammatory reaction may

enlarge; in addition, the hematoma can enlarge a result of new bleeding from torn veins⁸.

Surgery is the first option in the primary treatment of CSDH, which causes fatality and paralysis in elderly patients if not treated. No consensus has been reached about this surgery in the literature. The hematoma might be ejected by the injector after burr hole drainage with a mini incision and drainage with craniotomy.

In published studies it has been reported that burr hole craniotomy is a reliable method, although the hematoma may re-assemble at the rates of 9.2% to 26.5%^{9,10}. It has also been reported that mortality was 11% and morbidity was 25% for cases over age 65 after craniotomy^{9,10}. A compiled series of 48 studies observed that the mortality rate was 4.6%, the morbidity rate was 12.3% and the relapse rate was 10.8% after craniotomy and surgical drainage¹¹. The surgical option is based upon neuro-screening of the patient and the choice of the surgeon. Since the most patients with CSDH are 70-80 years of age, have chronic diseases and use anticoagulants, surgery poses high risks. After being anaesthetized, problems may include ventilator dependence, spontaneous respiration not returning and new bleeding occurring in the subdural area due to the

sudden increase intension during the wakening process.

For this reason, awake craniotomy and burr hole drainage might become the most applicable option for patients who are over 65 years of age, have chronic disease, have a low lung capacity and use anticoagulants. These parameters are crucial when choosing surgery. Fast drainage may be achieved with a burr hole and provide sufficient brain decompression inappropriate cases. Early mobilization of patients can avoid possible thrombosis, prevent lung atelectasis and keep the rates of intensive care and mechanic ventilator-related infections to a minimum.

Some studies have reported cases that were operated under local anesthesia. Liu et al. reported that burr hole drainage was performed on 368 cases under local anesthesia, and on 30 cases under general anesthesia¹². They observed that local anesthesia was efficient and safe in CSDH treatment. Durdag et al. reported that burr hole drainage was performed on 10 cases above the age of 70 under local anesthesia, while drainage with mini craniotomy was performed on 4 cases above the age of 74 under general anesthesia¹³.

Burr hole drainage under general anesthesia was performed on 10 cases whose median age was 72 years. In this study, one case who received burr hole drainage under general anesthesia died in the early post-operative period due to a hypertensive attack. One case from the craniotomy group that was operated under general anesthesia died as well. No post-operative mortality occurred in the group that was operated under local anesthesia.

In conclusion, 21 cases with CSDH who were over 65 years old were operated under local anesthesia and minimal sedation. No mortality was seen in the post-operative early period. We think that surgery under local anesthesia in the elderly patients with CSDH can provide early-period mobilization, early-period oral intake, short operation time and avoidance of possible general anesthesia complications. This procedure for CSDH can decrease the mortality and morbidity rates in this age group.

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