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ARAŞTIRMA / RESEARCH ARTICLE

Our surgical approach to the patients with blunt and penetrating head and neck trauma and its evaluation

F. Kasapoğlu, A. Ceyhan, Ö.A. Özmen, T. Özdemircan, H. Coşkun, O. Basut, S. Onart, İ. Hizalan

Künt ve penetran baş boyun travmalı hastalara cerrahi yaklaşımımız ve değerlendirilmesi

Amaç: Künt ve penetran baş-boyun travmalı hastalara cerrahi yaklaşımımızı değerlendirmek.

Yöntem: Çalışma Ocak 1997–2008 tarihleri arasında Uludağ Üniversitesi Tıp Fakültesinde, cerrahi uygulanan ve kayıtlarına ulaşılabilen 27 hastanın dosyası retrospektif olarak incelenerek yapıldı.

Bulgular: Çalışma kapsamına alınan 27 hastanın 9'u ateşli silah, 14'ü kesici-delici alet, 4'ü araç dışı trafik kazası ve diğer nedenlerle (suisit, araç içi trafik kazası vb.) olan yaralanmalardı. Hastaların hiçbirinde operasyon sonrası erken dönemde mortalite gelişmedi.

Sonuç: Hem künt hem de penetran boyun travmaları acil girişim gerektireblir. Boyunda travmatize olmuş organlar çeşitlilik gösterir ve çoğu otolaringoloji ile ilgilidir ki, bu durum iyi yetişmiş bir baş boyun cerrahının ekipte bulunmasını gerekli kılar.

Anahtar Sözcükler: Boyun travması, eksplorasyon.

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Abstract

Objectives: To evaluate our surgical approach to the blunt and penetrating head and neck trauma cases.

Methods: Twenty-seven patients who were operated for head and neck trauma at Uludağ University Faculty of Medicine, between January 1997 and January 2008, and whose registries were available were examined retrospectively.

Results: The etiology in nine of the patients was firearm injury, 14 of them were stab wounds, 4 of them had traffic accidents outside the vehicle and other causes (suicide, traffic accidents inside the car etc.). None of the patients had early mortality after the surgery.

Conclusion: Both blunt and penetrating neck traumas may require immediate intervention. Diversity of the traumatized organs in the neck, most of which are related to otolaryngology, necessitates the presence of a well trained head and neck surgeon in the team.

Key Words: Neck trauma, exploration.

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Introduction

As violence in society increases so does the incidence of neck traumas. Neck traumas occur more frequently in wars and conflicts. Today, traumas around head and neck area constitute up to 5-10% of all trauma cases.[1] Mortality rate may rise to 4% even in advanced trauma centers.[2] The basic criteria

Fikret Kasapoğlu, MD; Aydın Ceyhan, MD; Ömer Afşın Özmen, MD; Talip Özdemircan, MD; Hakan Coşkun, MD; Oğuz Basut, MD; Selçuk Onart, MD; İbrahim Hızalan, MD
Department of Otorhinolaryngology, Head and Neck Surgery, Medical School, Uludag University, Bursa

of trauma treatment is also valid for acute management of the neck injuries. The intervention includes securing airway, evaluation of systemic circulation, examination of the severity and classification of the injury.[3] Neck harbors many critical structures including airway, vascular structures, esophagus and nerves. Symptoms and findings may vary according to the damage to these structures.[4]

Injury to the neck that may be caused either by firearms and cutters or obtuse trauma warrants immediate treatment. Head and neck area is divided into three anatomical zones in respect to site of injury and its managements (Figure 1).[5,6]

Zone 1 is between cricoid cartilage and claviculas. It contains subclavian artery and vein, pleural apex, esophagus, recurrent laryngeal nerve and trachea.

Zone 2 is between cricoid and mandible angle. Larynx, pharynx, root of tongue, carotid artery, jugular vein, phrenic nerve and 10th and 12th cranial nerves reside here.

Zone 3 extends from the angle of mandible to cranial base. Zone 3 includes cervical, petrous, vertebral and cavernous portion of internal carotid artery; external carotid artery, middle meningeal artery, ascending pharyngeal artery, lingual artery, facial artery and internal maxillary artery, deep prevertebral plexus, jugular vein, 9th, 10th, 11th and 12th cranial nerves.

The aim of this research was to present our experience and surgical approach to the patients with head and neck trauma in the light of the literature.

Materials and Methods

In our study, records of 27 patients, who were operated for head and neck trauma between January 1997 and January 2008 and whose registries were available, were examined retrospectively. Demographic properties, etiology, location of the trauma, management and outcome of the patients

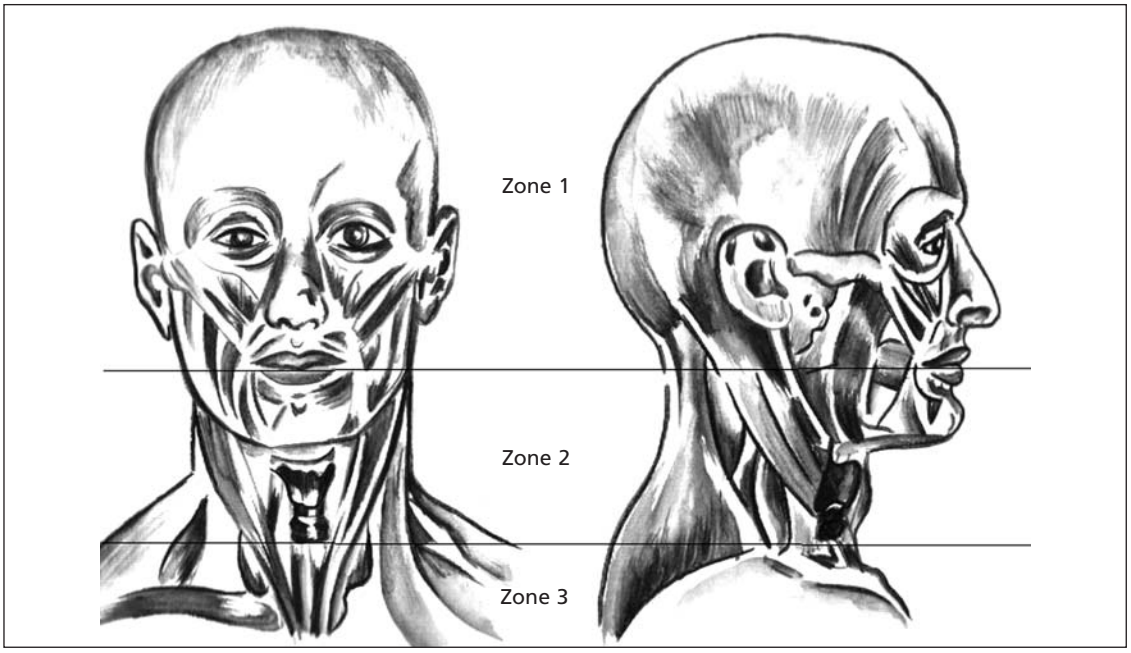

Figure 1. Anatomical zones of head and neck traumas.

were obtained. Due to small sample size, only descriptive statistics could be performed.

Results

The age of the patients ranged from 4 to 52 (mean age was 31±SD). The 22 of the patients were men (mean age was 33±SD) and 5 were women (mean age was 27±SD). Distribution of the patients according to type and localization of the injury was presented in Table 1. According to injury type, we classified the patients as firearm injuries, blunt injuries and stab wounds (Table 1-3). Patients were hospitalized for 3 to 14 days (mean hospitalization duration was 7±SD days). None of the patients had early mortality after operation. However, morbidities (hoarseness, dysphagia and hearing loss) were encountered postoperatively in some of the patients. These postoperative morbidities were considered to be the consequences of the trauma itself, rather than the surgery.

Table 1. Evaluation of firearm injuries, stab wounds and blunt neck traumas according to regions.

	Firearm injuries	Stab wounds	Blunt traumas	Total
Zone 1	0	2	0	2
Zone 2	6	9	3	18
Zone 3	3	3	1	7

Vocal cord paralysis was encountered in 2 of 7 patients who were operated due to larynx trauma. The paralysis in these patients were recognized preoperatively.

Internal jugular vein rupture was detected in 4 patients which was ligated in all cases. Another 4

Table 2. Evaluation of firearm injuries.

Fi	Age	Region	Operation	Result
1	30	3	Eye enucleation + extraction of bullets from parotid lobes	CTHL in right ear + vision loss in right eye, discharge on the 5th day.
2	52	3	Repair of the mandibula microplaque fixation	Bullet not extracted, discharge on the 6th day.
3	46	2	VJI ligation	No sequela, discharge on the 3rd day
4	11	2	Small shot cartridge extracted from carotid bifurcation	No sequela, discharge on the 3rd day.
5	30	2	VJI ligation	No sequela, discharge on the 7th day.
6	19	3	Bullet extracted from medial region of submandibular gland	Marginal mandibular nerve paralysis, discharge on the 5th day.
7	30	2	Bullet extracted transorally from piriform sinus.	No sequela, discharge on the 9th day.
8	50	2	Reconstruction of right thyroid cartilage	Right vocal cord paralysis, discharge on the 9th day.
9	22	2	Repair of left lateral hypopharyngeal wall	No sequela, discharge on the 10th day.

FI: Fire arm injuries, **VJI:** Vena jugularis interna, **CTHL:** Conductive type hearing loss.

Table 3. Evaluation of blunt neck trauma.

Blunt trauma	Age	Region	Operation	Result
1	47	2	Tracheotomy + thyroid cartilage reconstruction	Left vocal cord paralysis. Discharge on the 12th day.
2	50	2	Perforation of the hypopharyngeal wall was repaired;	No sequelaproblem, discharge on the 12th day.
3	30	3	Right neck exploration + control of perivertebral hemorrhage (CTS)+(NS)	Transferred to neurosurgery clinic with the suspicion of CSF leakage on the 3rd day.
4	16	2	Repair of strap muscles and control of bleeding	No sequela, discharge on the 3rd day.

CTS: Cardiothoracic surgery, **NS:** Neurosurgery.

Table 4. Evaluation of the patients with stab wound neck injury.

Stab wound injuries	Age	Region	Operation	Result
1	26	2	VJA ligation	No sequela, discharge on the 2nd day.
2	30	2	Laryngeal reconstruction + tracheotomy	No sequela, transferred to psychiatry clinic on the 11th day.
3	36	1	A piece of metal extracted from neck	No sequela, discharge on the 3rd day.
4	42	2	Thyroid membrane repair and tracheotomy	No sequela, discharge on the 8th day.
5	31	3	Neck exploration and tracheotomy	No sequela, discharge on the 3rd day.
6	7	2	VJA ligation and and n. accessorius anastomosis	Limited movement for left shoulder, discharge on the 3rd day.
7	41	2	Left VJI ligation	No sequela, discharge on the 5th day.
8	26	3	Neck exploration	No sequela, discharge on the 4th day.
9	32	2	A foreign object extracted from middle 1/3 ofleft SCM	No sequela, discharge on the 3rd day.
10	30	3	Right neck exploration and control of perivertebral hemorrhage	Plegia on the right arm.
11	16	2	Neck exploration	No sequela, discharge on the 3rd day.
12	22	2	Neck exploration	No sequela, discharge on the 5th day.
13	18	1	Neck exploration	No sequela, discharge on the 5th day.
14	4	2	Laryngeal reconstruction and tracheotomy	No sequela, discharge on the 4th day.

CTS: Cardiothoracic surgery, **NS:** Neurosurgery.

patients had minor vascular injuries (external, anterior juguler veins).

Two patients had paresis in extremities (Table 2, 3th patient; Table 3, 10th patient). Neurosurgeons participated in the operations of these patients anddebrided the damaged tissue due to perivertebral hemorrhage and trauma.

Eighteen patients (66%) were cured without any sequela. Tracheotomy had to be performed in six of the patients who were successfully decanulated afterwards (Tables 1-3).

Discussion

Penetrating neck injuries are divided into two groups according to whether it threatens the life of the patient or not. An immediate surgical exploration is imperative for injuries with sudden death risk (massive bleeding, enlarging hematoma or instable hematoma, hemomediastinum, hemothorax and hypovolemic shock).[3] In stable cases, Thal and Meyer[6] considered mandatory exploration or observational selective exploration for all penetrating neck traumas. On the other hand, it is emphasized in some literature that clinical situation of the patient should be monitored closely with frequent observation and diagnostic radiologic methods or with the endoscopies depending on the clinical circumstances, in stead of immediate surgery.[3,7] Conservative management is generally applicable for isolated cases but, radiological means and observation beds may not be sufficient for mass events and in cases of wars.[3]

Mandatory exploration idea was asserted by Fogelman and Steward in 1956.[8] However, this was changed in mid 1980's when it was realized that there had not been any important injury in the majority of the cases. Thus, selective exploration idea was adopted in the subsequent studies due to the high rate of negative explorations.[3]

Injuries of Zone 1 still have a high mortality rate (12%).[3,7] Angiography is recommended in order to make sure that any major veins are not damaged.[3] We did not perform angiography in the present

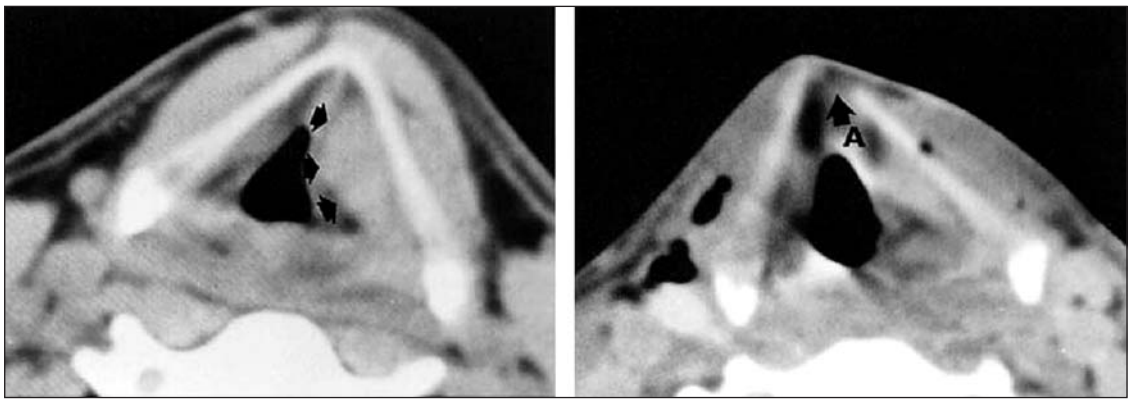

Figure 2. Anterior thyroidal lamina fracture after laryngeal trauma (computerized tomography). Arrows show hematoma in the right glottic region (**A**). A shows the fracture in the right anterior lamina of the thyroid cartilage (**B**).

group of patients, because their clinical conditions necessitated immediate interventions.

Surgical exploration of the injury to Zone 3 is dangerous because craniotomy is needed for the exploration and control of carotid artery injuries. It is important to perform a detailed neurological examination in this zone, in order to diagnose cranial nerve injuries. In one of our patients with an injury in this zone, there was conductive type hearing loss. Two patients had extremity plegia. One had facial plegia due to marginal mandibular nerve damage. Intraoral examination should repeatedly be performed in order to diagnose edemas and growing hematoma of parapharyngeal or retropharyngeal space.

Neck injuries are most frequently reported in Zone 2.[1,7,9] Furthermore, the most debatable zone for surgical exploration is the Zone 2.

Nason et al.[1] reported in a case series conducted in 130 patients that 15% of penetrating injuries occurred in Zone 1, 81% in Zone 2 and 4% in Zone 3. Our results are concordant with literature, as 8% of the injuries occurred in Zone 1, %67 in Zone 2 and 25% in Zone 3.

Fifteen percent of the patients evaluated in the Emergency Department of University of Uludağ, between the years 2001–2005.[10] were head and neck stab wounds Thirty-six percent of them were operated. In the same period the number of fire-arm injuries was 135 and 25 percent of them were in the head and neck region.[11] Therefore, Otolaryngology Clinics should be experienced in the management of these patients.

In laryngotracheal injuries requires special concern, for immediate and proper management may save the life of the patient, on the other hand, a delay in the treatment may jeopardize the life of the patient. Walter et al.[12] classified laryngotracheal

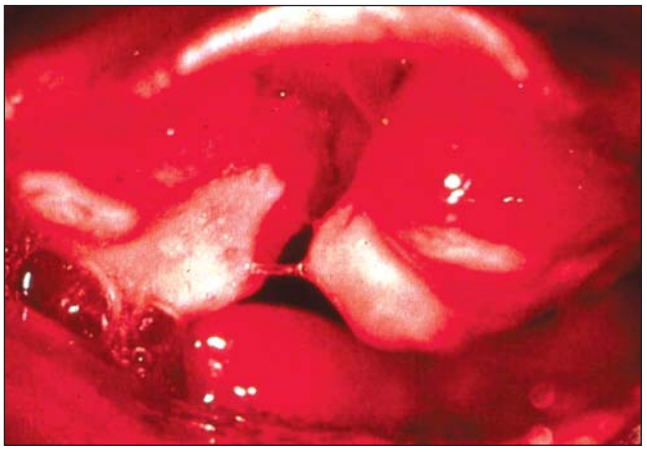

Figure 3. Laryngeal hematoma after laryngeal trauma. [Color figure can be viewed in the online issue, which is available at www.turkarchotolaryngol.org]

injuries according to symptoms and physical examination findings and emphasized that there should be a different treatment modality for each type of injury. The operations in our patients who had laryngotracheal injuries were performed in less than 24 hours (Figures 2 and 3). Seven patients had laryngeal reconstruction procedure and only in one patient tracheotomy was performed. Two patients had unilateral vocal cord paralysis which was not recovered in the follow-up.

In conclusion, both blunt and penetrating neck traumas may require immediate intervention. As presented in the present study, diversity of the traumatized organs in the neck, most of which are related to otolaryngology, necessitates the presence of a well trained head and neck surgeon in the team.

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Conflict of interest statement:
No conflicts declared.

Correspondence: Fikret Kasapoğlu, MD
Department of Otorhinolaryngology, Head and Neck Surgery,
Medical School, Uludag University
Nilüfer 16059 BURSA
Phone: +90 224 442 83 03
Fax: +90 224 442 80 91
e-mail: fkasapoglu@uludag.edu.tr