

HIGH-PRESSURE WATER JET INJURY TO THE PAROTID REGION

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Abstract

Introduction: The high-pressure water jet is used for cleaning in various business lines. However, these technological devices occasionally cause severe penetrating injuries in the head and neck region due to high-pressure water. Such high-pressure water injuries to the parotid region are rare.

Case Report: After high-pressure water jet injury, facial paralysis was present in a 37-year-old male patient who applied to the emergency department with an incision about 15-20 cm including skin, subcutaneous tissue, parotid gland and masseter muscle on the right side of the neck. In magnetic resonance imaging(MRI), there was no pathology showing deep veins, trachea, larynx, and oropharynx. For facial paralysis, prednisolone treatment was given intravenously(iv) and antibiotic therapy was started in response to the possibility of infection.

Conclusion: As the daily use of water jets becomes increasingly widespread, the prominence of these injuries is increasing. Early tissue repair is useful in reducing post-injury complications. We found it appropriate to present this issue in order to take attention to the public awareness of such head and neck injuries due to high-pressure water pumps.

Introduction

In today's high-pressure water jet devices used in washing and cutting processes, water which can reach 100 MPa (1000 bar, 14500 lbs / in², 1019 kg / cm³) with a jet speed of 900 mph (559 km) per hour is used. For this reason, injuries caused by these devices lead to severe injuries to the victim who has been exposed to bullet shots at close range. Solid materials in fire-arm injuries such as bullets, projectile have been replaced by liquids here. The high-pressure water flow that hits the body surface, the skin pierces with great speed and acceleration, passes through the subcutaneous tissue and travels along the vein and nerve sheaths (1,2). Water jet injuries are a high-energy injury. Body integrity and even life can be threatening. The most frequently injured body regions are the hands and this injury occurs in people who often inexperienced and unable to comprehend the dangers of this injury. Face injuries by water jet are very rare and only a few case presentations in the literature (3-5). This type of injuries especially occurring in the face region are often a job accident and also of legal importance. In the literature, since facial paralysis is not encountered after a water jet injury, we found it appropriate to present this case in order to raise awareness.

Case Report

A 37-year-old male patient, when he was washing with

water-jet in the ship, he had lost control of the water-jet in his hand, and after the rotation of it towards his face, very closely formed incision along the right jaw. On the immediate first examination, along with the lower edge of the right mandible, there was an approximately 15-20 cm irregular-edged incision which includes skin and subcutaneous tissue. The underlying tissues containing the masseter muscle and the parotid tail are fragmented, it was almost impossible to distinguish the structures from each other. The patient had paresis in the right oral commissure but there was no paresis in the eye and forehead area on the right side. There were numerous small lacerations on the right cheek and neck skin. Because the tissues are highly fragmented and hemorrhagic, ends of the marginal mandibular nerve could not be found despite the search for it under the microscope. Informed consent was taken from the patient. After the tissues are washed with the appropriate antiseptic solution, were then sutured. Initially, antibiotic prophylaxis was performed with ceftriaxone intravenously 1 gr twice daily for 5 days, whereas prednisolone was administered intravenously 250 mg single dose but then oral prednisolone therapy (1 mg/kg/day) was tapered over 10 days.

In computed tomography(CT) and magnetic resonance imaging(MRI), there was appearance consistent with strongly contingent changes in the subcutaneous tissue

of masseter muscle on the right side and subcutaneous tissue in the neighborhood. The remaining parotid tissue was reported as normal, although slight irregularity appeared in the parotid tail (Figure 1a,b and 2). On the 3rd day of hospitalization, facial paralysis was reaching to the Stage 3 of House Brackmann classification. On the 21st day electromyographic examination, "90% of subacute axonal degeneration findings in the right facial nerve" were detected. The patient has been examined after 6 months since the incident with a golden plate placed on the right upper eyelid (Figure 3).

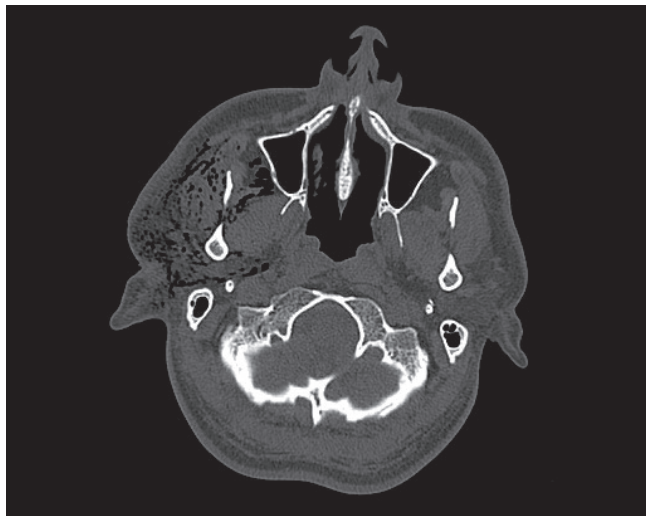


FIGURE 1A. Axial section of view; contusional changes in subcutaneous tissue in an adjacent masseter muscle on the right side.

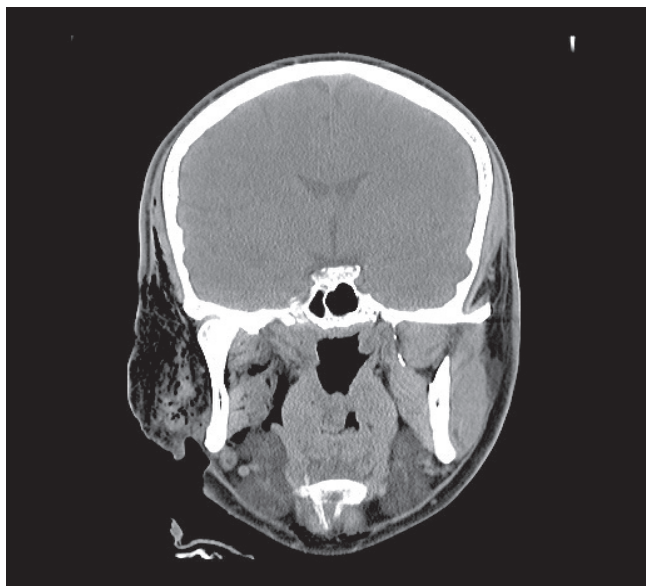


FIGURE 1B. Coronal section of view; loss of skin continuity in the parotid region with contusional changes

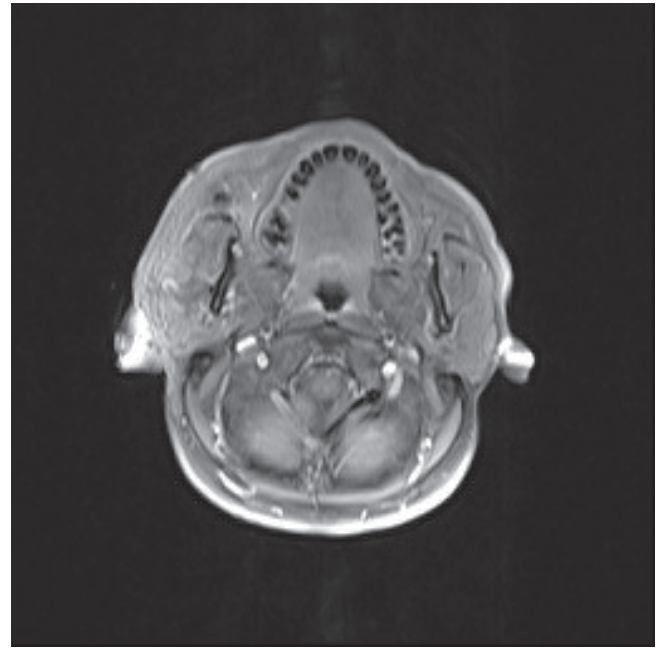


FIGURE 2. Axial section view of the neck and face on MRI: contusional changes in parotid region and irregularity in tail, normal appearance of remaining parotid tissue.



FIGURE 3. Scar tissue at the site of injury at 6 months postoperatively.

Discussion

Face injuries are most often caused by traffic accidents, beatings and firearm injuries. High-pressure water jet injuries are very rare in face region (5,6). Looking from the outside, although the wound seems unimportant, the damage from the beneath the skin can become more obvious. As the injuries connected to the pressurized systems are scattered in a high-energy enclosed compartment, they can cause damage far beyond what is apparently possible.

When we examined the pathophysiology of damage; it is possible to see that severe disturbance in the tissue, advanced disintegration, chemical irritation, and secondary infection cause very serious consequences (7-9).

In a study conducted on a child with oropharyngeal injuries caused by pressure water jet, further examination revealed contrast media extravasation in the nasopharyngeal region, deep maceration in the tonsillar region and pneumomediastinum in response to the only visible lesion is a small abrasion on the cheek (10).

When high-pressure water and air infiltrates between tissues; resulting in significant subdermal, mucosal injury. In addition to the direct primer injury caused by the water jet, thrombosis in the blood vessels is also caused by ischemia. In addition to tension-induced edema and inflammation created by pressurized water, tissue necrosis and infections due to secondary microorganisms that transfer into the tissue from the outside also increase edema and inflammation (6). The injury of the marginal mandibular branch of the facial nerve developing in our case is thought to be the primary cut created by the water jet. We think that facial paralysis develops on the 3rd day, is related to tissue edema and inflammation spread retrogradely along the nerve. Facial exploration was not considered due to the fact that facial paralysis developed in the forehead and eye area was not synchronous with the trauma and the tissues were severely fragmented.

Antibiotic prophylaxis and anti-edema therapy in this type of water jet injuries are especially recommended to prevent necrotizing pressures caused by secondary infection and widespread inflammation (2,6). We started high dose antibiotic-therapy and steroid treatment as of the first day.

Conclusion

As the daily use of water jets becomes increasingly widespread, the prominence of these injuries is increasing. It is reported that such injuries are often the result of work accidents and forensic cases. From a forensic point of view, the fact that it is a "fixed trail on the face" is an important issue as a medicolegal. In this respect, creating awareness at the point of view of such injuries of physicians will contribute to preventing important problems that may develop later.

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