Diffuse Neck Swelling after Car Accident

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The neck connects the head with the trunk, and is easily injured due to trauma. Herein we reported a case with diffuse neck swelling after car accident. She suffered from progressive dyspnea and cyanosis 3 hours after the accident and needed airway maintenance with tracheostomy. A plain lateral radiograph and computed tomography scan of the neck showed diffuse edema at deep neck spaces. We reviewed the medical literature on this subject, discussed the possible causes and management of the neck swelling.

Key words: Angioedema, Cervical Injury, Lymphedema, Neck Swelling, Whiplash Injury

The neck serves as the communication between the head and body, and contains important vital structures. The retropharyngeal space is a compact space located dorsally to the pharynx. Any cause of swelling in the retropharyngeal space may cause compression on the airway. Up to date, approximately 50 cases of the traumatic airway obstruction due to retropharyngeal hematoma have been reported in the literature [1]; however, most of them did not have diffuse edema at the soft tissue and third space (interstitial/potential space). Herein we presented a patient with remarkable neck swelling after accident and discussed the possible causes and the management of such neck swelling.

CASE REPORT

A 49-year-old woman dropped accidentally onto the improperly positioned platform in a mechanical parking garage, which was about three-story lower than ground. Three hours later she was rescued and sent to our Emergency Room (ER). At presentation she was alert and oriented and did not complain of dyspnea, dysphagia or hoarseness. Mild swelling at anterior neck was present but there was neither obvious skin bruise nor petechia over the neck. Neurological examination revealed sensory abnormalities and decreased muscle power in the upper extremities, worse in the distal forearms.

She was brought to the Radiology Department for plain radiographs of her cervical spine; however, she developed dyspnea progressively and then cyanosis during waiting. Oral endotracheal intubation was difficult due to deep neck swelling, and she underwent tracheostomy. A plain lateral radiograph (Fig. 1) and computed tomography (CT) scan (5 mm slice thickness) (Fig. 2) of the neck showed diffuse edema at deep neck spaces, especially the retropharyngeal space. The airway was obliterated from the level of the second cervical vertebra to the cervicothoracic junction. There was neither cervical bone fracture nor extravasation. Magnetic resonance (MR) images of the cervical spine showed subtle abnormal signal intensity at the cervical cord around C5-6, high signal intensity on T2 weighted image (T2WI) and low signal intensity
on T1WI, consistent with spinal cord edema. Direct laryngoscopy revealed a symmetrical pharyngeal wall swelling and normal vocal cords.

She was admitted to the intensive care unit and managed with intravenous corticosteroid. Because of early improvement of neck swelling and neurological deficits, the corticosteroid was tapered and tracheostomy tube was removed on the seventh and eighth day respectively. She was discharged on the seventeenth day in good condition.

DISCUSSION

The neck contains important vital organs, including trachea, esophagus, major blood vessels, peripheral nerves and the spinal cord, which connect the head and the body. The retropharyngeal space is more important than other spaces in the neck because this compact space is located dorsally to the airway. Regardless the causes of swelling in this space, it may result in airway obstruction.

After a thorough search of the medical literature, there are five major etiologic categories of neck swelling: (1) angioedema [2-4], (2) vascular lesion [1, 5-8], (3) infection [9], (4) denervation [10], (5) lymphedema [5, 11]. This patient developed dyspnea and cyanosis three hours after the accident. She could not recollect the details about the accident; thus, we did not know the mechanism of the trauma. Due to trauma history and without evidences of infection symptom and sign, only three categories should be considered: angioedema, hematoma or lymphedema.

This patient in the car fell down from a three-story height to the basement floor. In this kind of collision, the safety belt fixed the body and the patient underwent flexion of the cervical spine, which was followed by hyperextension, so-called “whiplash injury” [12]. The forceful motion of head and neck leads to contusion and laceration of the soft tissues [6].
and tear the vessels [8] or the microcirculations, including lymphatic or capillary destructions [1, 7, 13], which induce the fluid or blood accumulations in the third space. Hematoma is commonly first considered when an upper airway obstruction after traumatic injury is encountered [1, 5-8]. However, on her arrival at our ER, there was no common sign of direct contusion, such as skin bruise and petechia over the neck. There was neither hyperdense fluid collection nor contrast extravasations on the CT imaging. As a result, hematoma was not likely.

In this patient, CT scanning showed low density at the neck outside the muscle and major vascular structures, compatible with fluid collection. However, airway obstruction due to simple soft tissue edema is uncommon following trauma because the amount of local tissue is too small to cause significant edematous swelling [14]. Acute lymphedema may be another etiology, and it can occur soon or several hours after neck injury or post-operation of radical neck lymph node dissections [5, 11]. It may be caused by disturbance of lymphatic flow due to trauma or operation. Usually, management of the lymphedema itself is not necessary and it could take several weeks to develop collateral venous and lymphatic drainage to relieve spontaneously [5, 6]. In this patient, the neck swelling reduced in one week; perhaps, the lymph microcirculation was partially torn and could recover faster than that in the cases of radical neck lymph node dissections.

Angioedema (or angioneurotic edema) is a hereditary or acquired disorder predisposing the patient to diffuse submucosal and/or subcutaneous swelling. It is typically manifested in the head and neck, resulting in a significant risk in airway compromise. There are three main etiologic categories: allergic reaction to food or drugs, hereditary, and idiopathic [3, 15]. Allergic reaction is the most common cause for angioedema, but about 25% of patients have no clear cause [3]. Although this patient has had no further incidents of angioedema and did not take any medication or food before driving, mechanical trauma or emotional stress is another precipitating factor [2, 16]. However, swelling of the tongue and visceral space is perhaps the most clinical obvious sign distinguishing angioedema from other categories [2], which is not seen in this patient.

The diagnosis of retropharyngeal swelling relies on clinical examination and radiographs. Except for hematoma, increased index of suspicion of the possibility of airway obstruction secondary to massive lymphedema or angioedema after neck injury is needed. When the patient with suspicious neck injury arrive the ER, no matter respiratory distress or not, the pharyngeal mucosa should be examined first before he/she undergoes imaging study, which was also suggested by Brown and Millar after radical neck dissection [13]. If the mucosa appears edematous or swelling, there may be a higher risk of developing an airway obstruction. The prudent treatment is necessary to eliminate occurrence of airway obstruction, such as close observation and monitoring at the intensive care unit, endotracheal intubation or tracheostomy [13]. In general, the retropharyngeal soft tissue should measure no more than one third to one half of the width of the cervical vertebra [7]. An increased width of the soft tissue in retropharyngeal space on lateral radiographs would also suggest an abnormal finding. In addition, CT scan is a powerful modality which detects the retropharyngeal pathology more accurately.

The most important management of acute-onset neck swelling is to secure the airway. Generally, the first choice is oral endotracheal intubation [1], but it may be difficult due to anatomic distortion caused by neck swelling, such as for this patient. Tracheostomy is advocated if oral endotracheal intubation is impossible [8, 17]. If there is no experienced physician for oral intubation or tracheostomy, needle cricothyroidotomy is another safe and quick method to reestablish the airway [17]. Management of the lymphatic microcirculation tearing or small hematoma themselves is not necessary, and the patient could receive observation until it relieves spontaneously over a 2 to 3-week period of time [5, 6]. Large hematoma requires surgical intervention for drainage [6].

CONCLUSION

If a patient comes from the scene of the traffic accident, a high index of suspicion of airway obstruction is crucial. Before imaging study, good evaluation and proper management including protection of the airway are suggested. We believe that clinician and radiologist should consider this potentially life-threatening condition in any patient with neck injury and familiarize themselves with the technique of airway protection, especially the needle cricothyroidotomy.

REFERENCES

車禍後頸部廣泛異常腫大之罕見病例報告

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頸部是聯繫頭和身體的重要構造，內含許多重要的器官，容易在加速度下受到傷害。一但有任何傷害，可能影響呼吸造成死亡。一位中年女性誤入尚未升起之機械式停車位，而直接跌落三層樓高的地下室。病患三小時候後被救出，送至本院急診時意識清楚，僅抱怨手麻、無力和頸部疼痛。在攝影室前等候影像檢查時，呼吸越來越困難，終至發紺。經緊急實施氣管切開術併氣管內插管，病人恢復意識，轉入加護病房。我們報導此一罕見的車禍現象，並且探討造成此罕見頸部腫大的原因以及第一線醫療人員及放射線科醫護人員該如何早期發現瀕臨呼吸道阻塞之徵兆與緊急處治之方式。

關鍵詞：血管神經性水腫，頸部傷害，淋巴水腫，頸部腫脹，馬鞭式創傷