

A study of pattern and prevalence of vertebral artery injury in patients with cervical spine fracture

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Abstract

Introduction: Vertebral artery injuries are rare, with an incidence of 0.1 - 1.0%, if all patients admitted with blunt head trauma are considered. It is not unusual for vertebral artery injury to occur when there are fractures through the transverse foramina of the first to the sixth vertebrae. Woodring *et al.* **Aims and Objectives:** To Study Pattern and Prevalence of Vertebral Artery Injury in Patients with Cervical Spine Fracture. **Methodology:** This was a Cross-sectional study at the Radiology Department of a tertiary health care center in patients with Cervical Spine Fracture during the one year period from January 2015 to January 2016. Total 158 patients were referred to Radiology department the study period. The demographic information and detailed radiological features were recorded. CTA was performed on a Philips multi-detector CT scanner (Brilliance 15, Netherlands; Serial Number 7636). Routine CTA protocols of the neck are titled 'CT neck angiogram', 'CT cervical spine angiogram' and 'CT carotid angiogram'. The CT scan database was searched according to these protocol titles. The CT database also has a list of all patients who have been scanned, as well as the type. **Result:** In our study we found The majority of the patients were from the age group of 30-40-26.58% followed by 20-30-24.05%;40-50-18.35%;50-60-13.92%; 10-20-9.49%; >60 -7.59%.The majority of the Patients were Male i.e. 51.90% as compared to Females 48.10%. The most common mechanism of Injury was Motor vehicle accident-41.13%;Pedestrian/vehicle accident-17.08%;Fell off a bicycle-13.92%;Fell From Tree -12.65%;Assault-7.59%;Fell from Building -7.59% The most common radiological findings with Vertebral artery spasm and level of Vertebral artery injury was -level From origin to C2-Complete occlusion from C3 to C6 ; From origin to C7-Eccentric thrombus compressing the lumen ;From origin to C3-Complete occlusion from C2 to C3 ;From origin to C1-No vessel injury From C2 to C7 Complete occlusion at C2. **Conclusion:** CTA is very important to early identification and exclusion vertebral artery injury in the Cervical Spine Fracture.

Key words: Vertebral Artery Injury, Cervical Spine Fracture, Vertebral artery thrombosis (VAT).

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Received Date: 16/09/2014 Revised Date: 11/10/2014 Accepted Date: 04/11/2014

Access this article online

Quick Response Code:	Website: www.medpulse.in
	DOI: 06 November 2014

INTRODUCTION

Vertebral artery injuries are rare, with an incidence of 0.1 - 1.0%, if all patients admitted with blunt head trauma are considered.¹ It is not unusual for vertebral artery injury to

occur when there are fractures through the transverse foraminae of the first to the sixth vertebrae. Woodring *et al.*² found the incidence of vertebral artery injury to be 78% in patients who had fractures through the transverse foraminae. Other important risk factors for vertebral artery injury include facet joint dislocations and fractures of the first to the third cervical vertebrae.^{3,4} Injury to the vertebral arteries can result in permanent brain injury via ischaemia to the posterior circulation territory of the brain. Vertebral-basilar insufficiency may occur if either both vertebral arteries or the dominant vertebral artery is injured. Other sequelae include downstream embolisation of a thrombus, anterior spinal artery compromise causing spinal cord ischaemia, and occlusion of blood flow to the posterior inferior cerebellar artery (PICA), causing lateral medullary syndrome.⁵ Vertebral artery thrombosis (VAT)

is a complication of cervical spine injury with potentially fatal complications. VAT is a subset of vertebral artery injuries (VAI), which also include dissection and transection (rare). The incidence of VAIs overall following cervical spinal injury varies considerably in the published trauma literature, with incident rates ranging from 3% to 88%⁶⁻¹⁰. Possible explanations for the variable incident rates include patient selection biases, small patient cohorts (usually 20 patients with VAT), variation in imaging technique, type of injury, and inconsistencies in patient evaluation. Posttraumatic VAT is often asymptomatic, and the impact of VAT on neurologic outcome is unknown. Moreover, unless this complication is screened for at the time of injury, it may remain undetected.

METHODOLOGY

This was a Cross-sectional study at the Radiology Department of a tertiary health care center in patients with Cervical Spine Fracture during the one year period from January 2015 to January 2016. Total 158 patients were referred to Radiology department the study period. The demographic information and detailed radiological features were recorded. CTA was performed on a Philips multi-detector CT scanner (Brilliance 15, Netherlands; Serial Number 7636). Routine CTA protocols of the neck are titled ‘CT neck angiogram’, ‘CT cervical spine angiogram’ and ‘CT carotid angiogram’. The CT scan database was searched according to these protocol titles. The CT database also has a list of all patients who have been scanned, as well as the type.

RESULT

Table 1: Age wise distribution of the Patients

Age	No.	Percentage (%)
10-20	15	9.49%
20-30	38	24.05%
30-40	42	26.58%
40-50	29	18.35%
50-60	22	13.92%
>60	12	7.59%
Total	158	100.00%

The majority of the patients were from the age group of 30-40-26.58% followed by 20-30-24.05%;40-50-18.35%;50-60-13.92%; 10-20-9.49%; >60 -7.59%.

Table 2: Gender wise distribution of the Patients

Sex	No.	Percentage (%)
Male	82	51.90%
Female	76	48.10%
Total	158	100.00%

The majority of the Patients were Male i.e. 51.90% as compared to Females 48.10%.

Table 3: Distribution of Patients as per the Mechanism of injury

Motor vehicle accident	65	41.13%
Assault	12	7.59%
Pedestrian/vehicle accident	27	17.08%
Fell off a bicycle	22	13.92%
Fell From Tree	20	12.65%
Fell from Building	12	7.59%
Total	158	100%

The most common mechanism of Injury was Motor vehicle accident-41.13%;Pedestrian/vehicle accident-17.08%;Fell off a bicycle-13.92%;Fell From Tree -12.65%;Assault-7.59%;Fell from Building -7.59%.

Table 4: Distribution of the Patients as per the vertebral artery spasm level vertebral artery injury

Vertebral artery spasm level	Vertebral artery injury level
From origin to C2	Complete occlusion from C3 to C6
From origin to C7	Eccentric thrombus compressing the lumen
From origin to C3	Complete occlusion from C2 to C3
From origin to C1	No vessel injury From C2 to C7 Complete occlusion at C2

The most common radiological findings with Vertebral artery spasm and level of Vertebral artery injury was - level From origin to C2-Complete occlusion from C3 to C6 ; From origin to C7-Eccentric thrombus compressing the lumen ;From origin to C3-Complete occlusion from C2 to C3 ;From origin to C1-No vessel injury From C2 to C7 Complete occlusion at C2.

DISCUSSION

Many published studies on vascular injury to the neck collectively refer to traumatic blunt injury to either the carotid or vertebral arteries (BCVI, or blunt carotid and vertebral injury). Multicenter trauma reviews report an incidence of blunt carotid injury ranging from 0.08% to 1.1% and isolated vertebral artery injury as less frequent (7–11). Blunt injuries to the vertebral arteries have the potential to present with devastating strokes. Miller *et al* (15) reported a stroke rate of 54% for untreated blunt vertebral artery injury (BVAI), whereas Biffel *et al*⁷ In our study we found The majority of the patients were from the age group of 30-40-26.58% followed by 20-30-24.05%;40-50-18.35%;50-60-13.92%; 10-20-9.49%; >60 -7.59%. The majority of the Patients were Male i.e. 51.90% as compared to Females 48.10%.

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C2 to C3 ;From origin to C1-No vessel injury From C2 to C7 Complete occlusion at C2.

CONCLUSION

CTA is very important to early identification and exclusion vertebral artery injury in the Cervical Spine Fracture.

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Source of Support: None Declared
Conflict of Interest: None Declared