

# Iatrogenic vertebral artery injury

[Vertebral artery arteriovenous fistula](#) (AVF), after [iatrogenic vertebral artery injury](#) (VAI), is a serious complication of [upper cervical spine](#) fixation surgery.

Since the [cervical lateral mass screw fixation](#) technique has been well established, the concern of vertebral artery injury is higher than ever before <sup>1)</sup>.

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[Posterior fusion of the atlas and axis by transarticular screw fixation](#) or Magerl screws pose an additional risk of [iatrogenic vertebral artery injury](#), neurological deficit or inadequate bony purchase.

Vertebral artery injury is one of the most dangerous complications of screw fixation and is usually due to incorrect cervical pedicle screw entry with vertebral artery injury. The incidence of iatrogenic vertebral artery injury is 1.3%–4% for Magerl fixation <sup>2)</sup>. Fortunately, the risk of neurological deficit is low (0.2%) <sup>3)</sup>. Mortality is greatly increased if both vertebral arteries are injured. Lateral deviation of screws can often lead to penetration of the foramen transversalis and subsequent vertebral artery injury <sup>4)</sup>. Current trends include the use of intraoperative CT and computer-assisted navigation systems to improve screw trajectory and reduce screw perforation <sup>5) 6)</sup>.

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Although [vertebral artery injury](#) (V2) may occur during an [anterior cervical approach](#), ([uncoforaminotomy](#)), the frequency of vertebral artery injury is actually low <sup>7) 8)</sup>.

Qian et al., report a case of a 59-year-old female patient who had a vertebral AVF following transpedicular [occipitocervical fixation](#) surgery. Endovascular embolization of the AVF was successfully performed using ethylene vinyl alcohol. From this case they learned that preoperative evaluation of the course of the [vertebral artery](#) is necessary, and vertebral artery embolism is an effective and safe method to treat vertebral AVF after proof of a patent second vertebral artery <sup>9)</sup>.

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In standard [anterior cervical discectomy](#), complete resection of the uncinate process is not commonly attempted because of the risk of injury to the vertebral artery. This may result in incomplete decompression of the nerve root when there is severe osseous [cervical foraminal stenosis](#).

Iatrogenic [vertebral artery](#) injury (VAI) is a rare but significant complication of anterior [cervical spine surgery](#). In the grossly degenerate cervical spine the VA may adopt a tortuous pathway thus predisposing to inadvertent injury during surgery <sup>10)</sup>.

In a high-volume surgical center, the incidence of VAI during low-risk cervical spine surgery is extremely low, comprising 0.3 % of all cases. The major risks are delayed sequels of the vessel wall laceration. In cases of VAI, immediate angiographic diagnostics and generous indications for endovascular treatment are obligatory <sup>11)</sup>.

<sup>1)</sup>

Abumi K, Itoh H, Taneichi H, Kaneda K. Transpedicular screw fixation for traumatic lesions of the middle and lower cervical spine: description of the techniques and preliminary report. Journal of spinal

disorders 1994;7:19-28.

2)

Neo M, Fujibayashi S, Miyata M, Takemoto M, Nakamura T. Vertebral artery injury during cervical spine surgery: a survey of more than 5600 operations. *Spine (Phila Pa 1976)* 2008;33:779-785.

3)

Wright NM, Lauryssen C. Vertebral artery injury in C1-2 transarticular screw fixation: results of a survey of the AANS/CNS section on disorders of the spine and peripheral nerves. *American Association of Neurological Surgeons/Congress of Neurological Surgeons. J Neurosurg.* 1998;88:634-640.

4)

Neo M, Sakamoto T, Fujibayashi S, Nakamura T. The clinical risk of vertebral artery injury from cervical pedicle screws inserted in degenerative vertebrae. *Spine (Phila Pa 1976)* 2005;30:2800-2805.

5)

Ludwig SC, Kramer DL, Balderston RA, Vaccaro AR, Foley KF, Albert TJ. Placement of pedicle screws in the human cadaveric cervical spine: comparative accuracy of three techniques. *Spine (Phila Pa 1976)* 2000;25:1655-1667.

6)

Richter M, Mattes T, Cakir B. Computer-assisted posterior instrumentation of the cervical and cervico-thoracic spine. *Eur Spine J.* 2004;13:50-59.

7)

Cho KH, Shin YS, Yoon SH, Kim SH, Ahn YH, Cho KG. Poor surgical technique in cervical plating leading to vertebral artery injury and brain stem infarction-case report. *Surgical neurology* 2005;64:221-225.

8)

Hsu WK, Kannan A, Mai HT, Fehlings MG, Smith ZA, Traynelis VC, Gokaslan ZL, Hilibrand AS, Nassr A, Arnold PM, Mroz TE, Bydon M, Massicotte EM, Ray WZ, Steinmetz MP, Smith GA, Pace J, Corriveau M, Lee S, Isaacs RE, Wang JC, Lord EL, Buser Z, Riew KD. Epidemiology and Outcomes of Vertebral Artery Injury in 16 582 Cervical Spine Surgery Patients: An AOSpine North America Multicenter Study. *Global spine journal* 2017;7:21s-27s

9)

Qian R, Li Z, Li M. Vertebral Arteriovenous Fistula: A Rare Complication Following Transpedicular Occipitocervical Fixation in a Patient with Atlantoaxial Dislocation. *J Neurol Surg A Cent Eur Neurosurg.* 2018 Jul 2. doi: 10.1055/s-0038-1655771. [Epub ahead of print] PubMed PMID: 29966140.

10)

Khan SA, Coulter I, Marks SM. Iatrogenic vertebral artery injury secondary to vessel tortuosity in a grossly degenerate cervical spine. *Br J Neurosurg.* 2014 Jun;28(3):423-5. doi: 10.3109/02688697.2014.913772. Epub 2014 May 8. PubMed PMID: 24810983.

11)

Obermüller T, Wostrack M, Shibani E, Pape H, Harmening K, Friedrich B, Prothmann S, Meyer B, Ringel F. Vertebral artery injury during foraminal decompression in "low-risk" cervical spine surgery: incidence and management. *Acta Neurochir (Wien).* 2015 Nov;157(11):1941-5. doi: 10.1007/s00701-015-2594-2. Epub 2015 Sep 29. PubMed PMID: 26416610.

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