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[Case Reports]

Endovascular Management of a Basilar Artery False Aneurysm Secondary to Endo Report

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Abstract

OBJECTIVE AND IMPORTANCE : Third ventriculostomy for the management of noncommunicating hydrocephalus is a complication rate. One of the known complications is basilar artery injury.

CLINICAL PRESENTATION : We report a case of basilar artery injury, intraventricular hemorrhage, and false aneurys ventricle floor fenestration.

INTERVENTION : The false aneurysm was managed with endovascular trapping by use of Guglielmi detachable coils

CONCLUSION : Endovascular therapy can be used successfully to manage vascular injury after third ventriculostom

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Endoscopic third ventriculostomy has become a viable alternative to shunting for the management of noncommuni this procedure remains approximately 5%, with risks that include intraparenchymal bleeding and vascular injury with su hemorrhage. In 1997, our institution reported the development of a basilar artery (BA) aneurysm after laser fenestratio This lesion, which ruptured, was managed successfully via a subtemporal craniotomy and aneurysm clipping. The patier endoscopic third ventricle floor fenestration by use of a Bugby wire in a 30-month-old boy. The injury resulted in a BA f endovascular embolization.

CASE REPORT

An 18-kg, 30-month-old boy with noncommunicating hydrocephalus and a Chiari I malformation underwent endosco
(Karl Storz GmbH & Co., Tuttlingen, Germany). A Bugby wire with low coagulating current was used to fenestrate the tl
infundibular recess. As soon as the floor was fenestrated, brisk arterial bleeding came forth. The endoscope was withdr
the introducer sheath. The cerebrospinal fluid was irrigated and bleeding ceased. The ventricular catheter was left in p
the procedure was terminated. The patient awoke slowly. A computed tomographic scan obtained immediately reveale
interpeduncular cistern and the lateral and third ventricles. The next day, a cerebral arteriogram demonstrated a 6- to
below the level of the superior cerebellar arteries (SCAs) along the anterior basilar wall (Figs. 1 and 2). The patient hac
The right PComA was not fetal although the left one was.

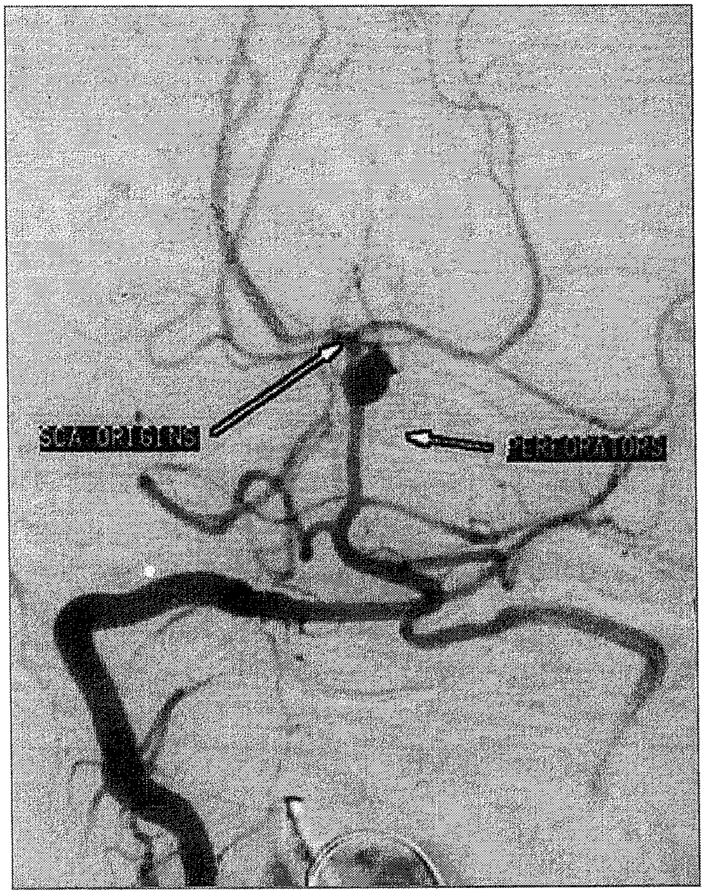

FIGURE 1. Anteroposterior right vertebral artery arteriogram showing the BA pseudoaneurysm.

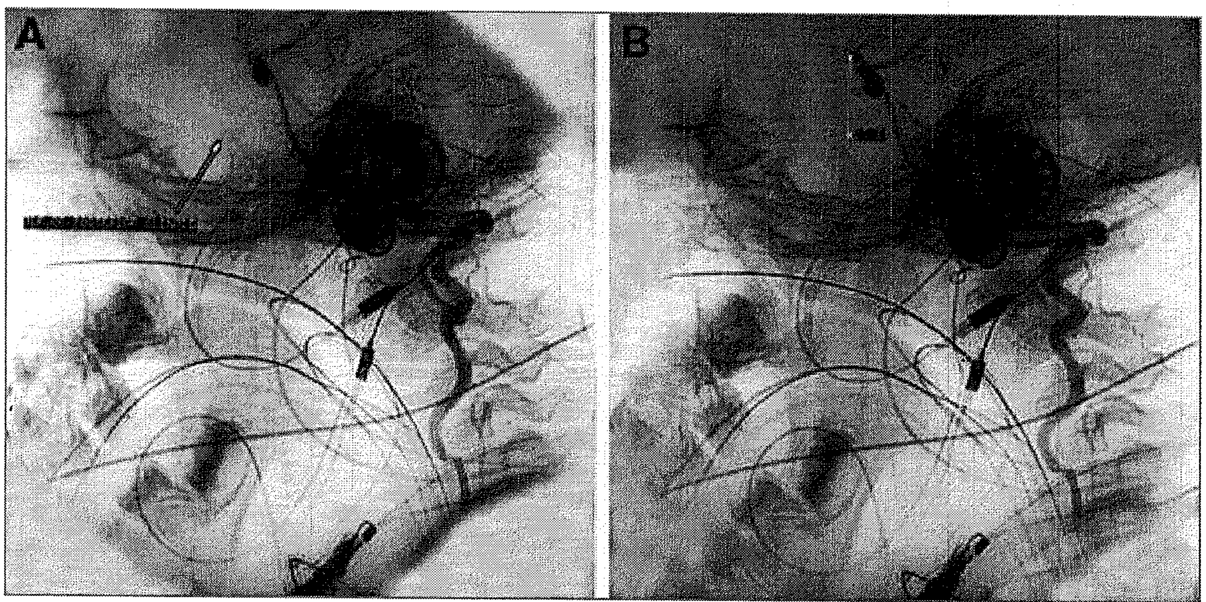

FIGURE 2. Lateral vertebral artery arteriograms showing the basilar trunk pseudoaneurysm (*A*) and the height of the ba:

The next day, the patient was returned to the angiography suite. He was placed under general endotracheal anestl Neurophysiological monitoring by use of electroencephalography, somatosensory evoked potentials, and brain stem aud micropuncture set was used to insert a 6-French sheath. The right vertebral artery was selectively catheterized with a Falls, NY) and the patient was heparinized with 1800 units of heparin. Activated coagulation time obtained 20 minutes during the next hour, and heparin was excluded from the flush bags. After diagnostic studies of the vertebrobasilar syst (Cordis, Miami Lakes, FL) was advanced over a 0.014-inch Transend wire (Boston Scientific/Target, Natick, MA) to a pos the SCAs (Fig. 3). The BA above the aneurysm, the aneurysm itself, and the BA just below the aneurysm were then emb detachable coils ranging in length from 2 to 6 cm. After the aneurysm was trapped and embolized, repeat angiography internal carotid artery arteriography revealed filling of the right posterior cerebral, distal basilar, and bilateral SCAs (F demonstrated BA opacification to the level of the aneurysm base with filling of small mid-BA perforators.

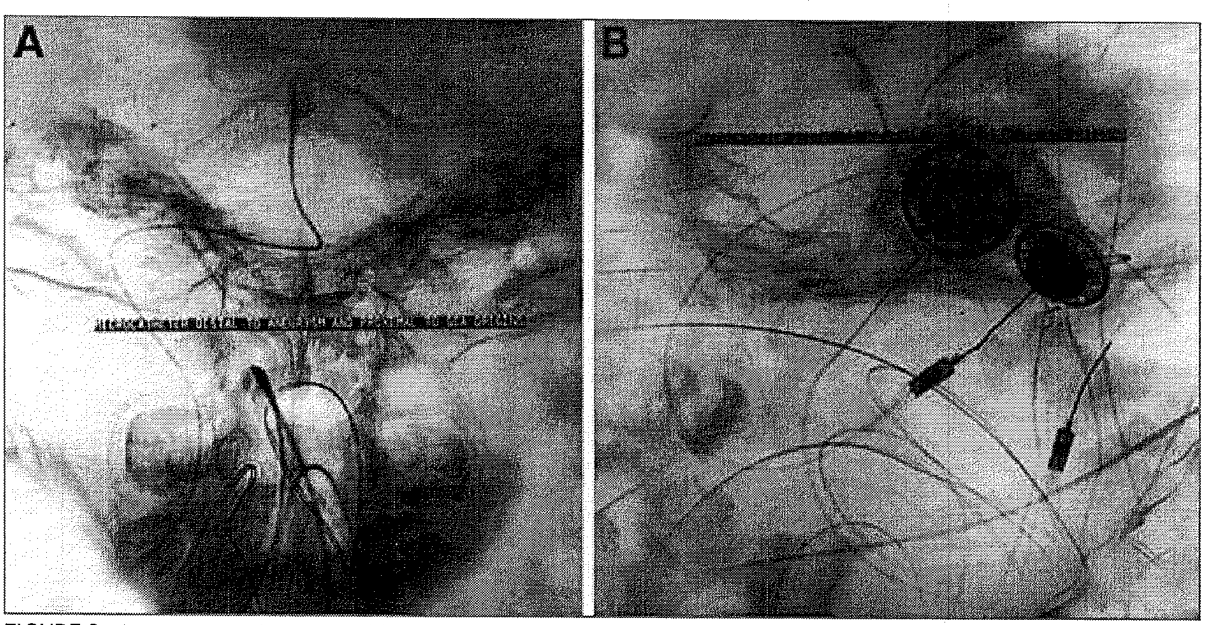

FIGURE 3. Anteroposterior (*A*) and lateral (*B*) angiograms showing microcatheter positioned with its tip just distal to th

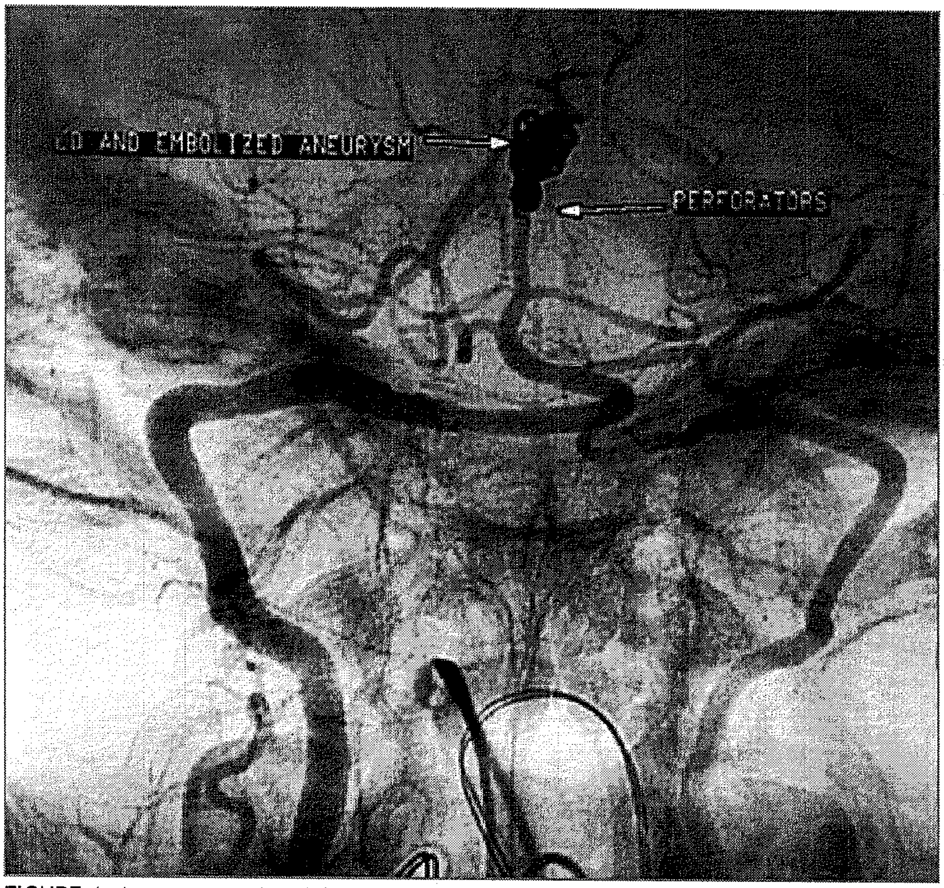

FIGURE 4. Anteroposterior right vertebral artery arteriogram after coil deposition and aneurysm trapping. No aneurysm

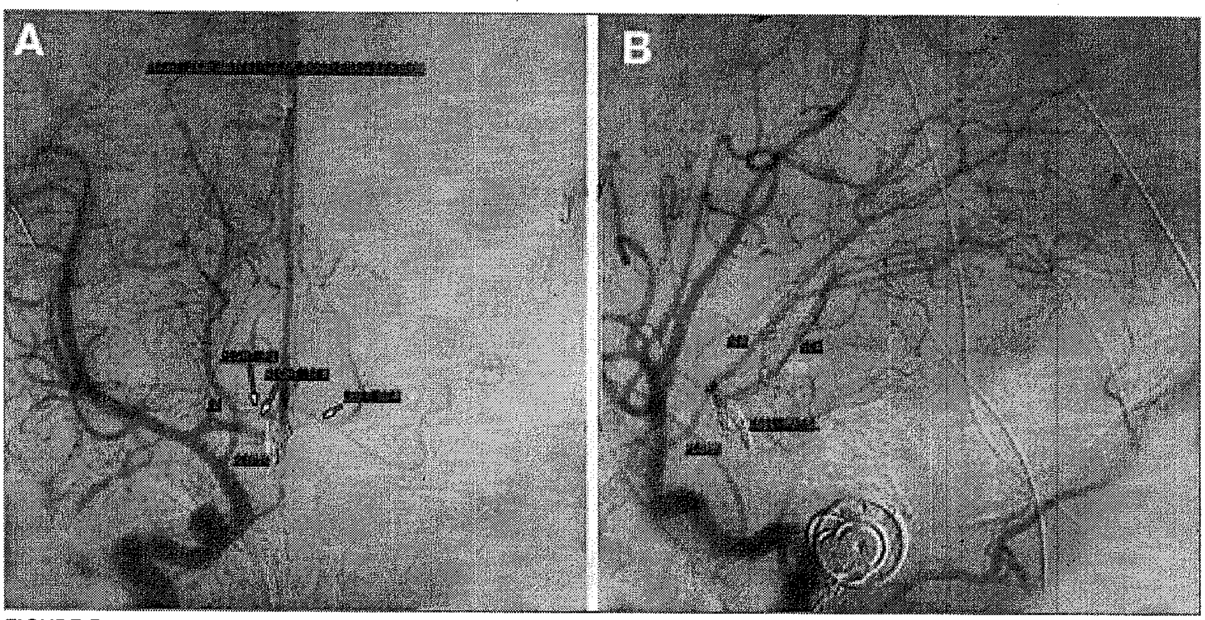

FIGURE 5. Anteroposterior (*A*) and lateral (*B*) right common carotid arteriograms showing retrograde filling of the BA, ri right PComA. The coil mass can be observed just below the SCAs. No aneurysm opacification is identified.

Throughout the procedure, no changes in neurophysiological monitoring parameters were noted. Burst suppression administered aspirin, and heparin was discontinued but not reversed. Two days later, the patient underwent magnetic aneurysm obliteration and flow through the posterior cerebral arteries, distal BA, and proximal BA (Figs. 6 and 7). The midbrain without associated ischemic findings on diffusion studies (Figs. 8 and 9). The next day, the child was extubate

hemiparesis, which improved during the ensuing days. Of interest, the hemiparesis did not correlate with the left midb
The patient underwent ventriculoperitoneal shunting 1 week later without incident and was discharged home. A 6-mon
MRI/magnetic resonance angiography.

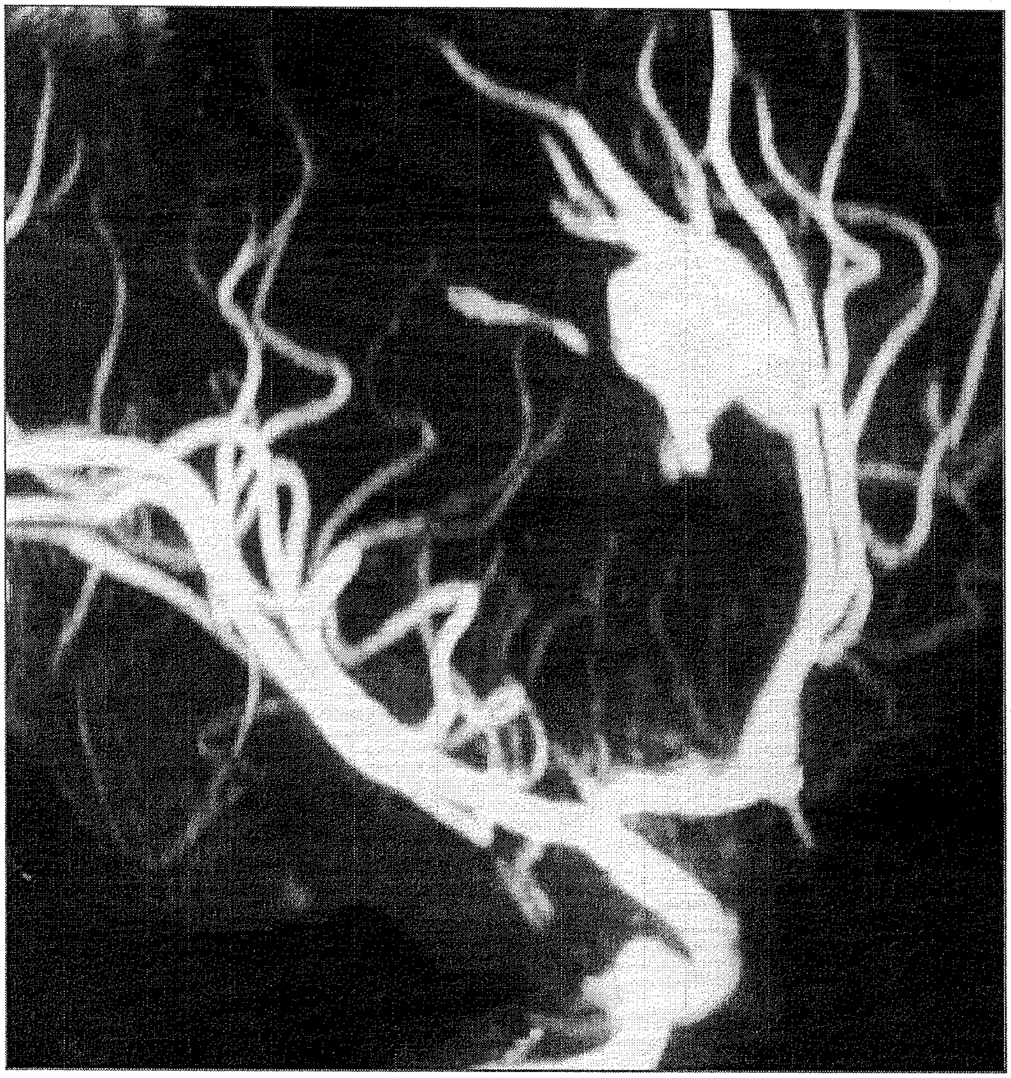

FIGURE 6. Magnetic resonance angiogram, 2 days after embolization, showing posterior cerebral flow.

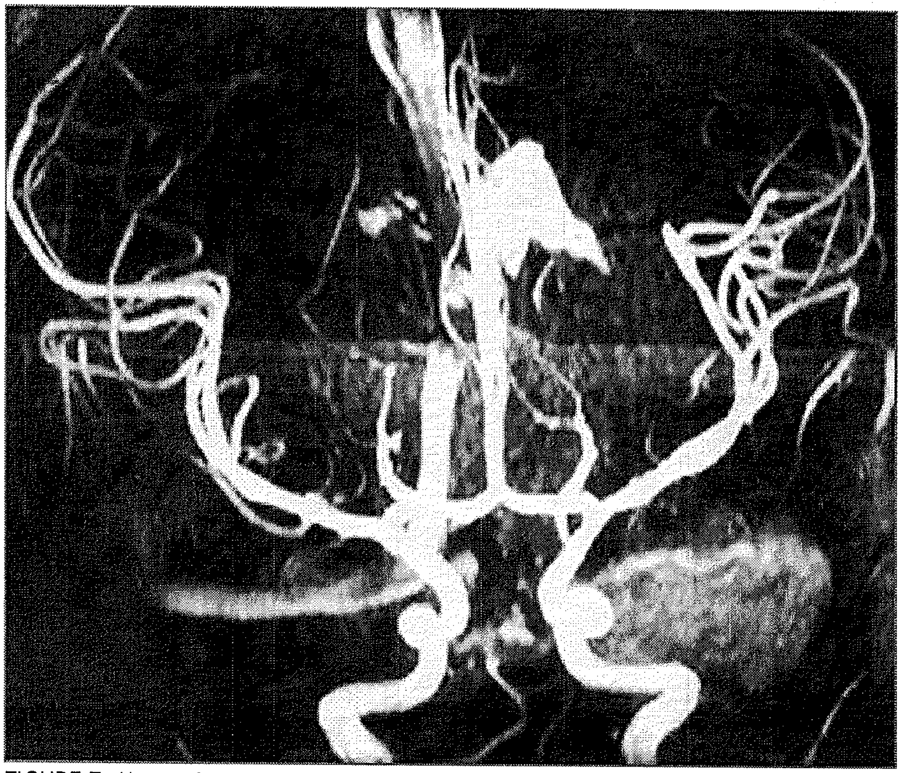

FIGURE 7. Magnetic resonance angiogram, 2 days after embolization, showing vertebral artery and proximal BA flow.

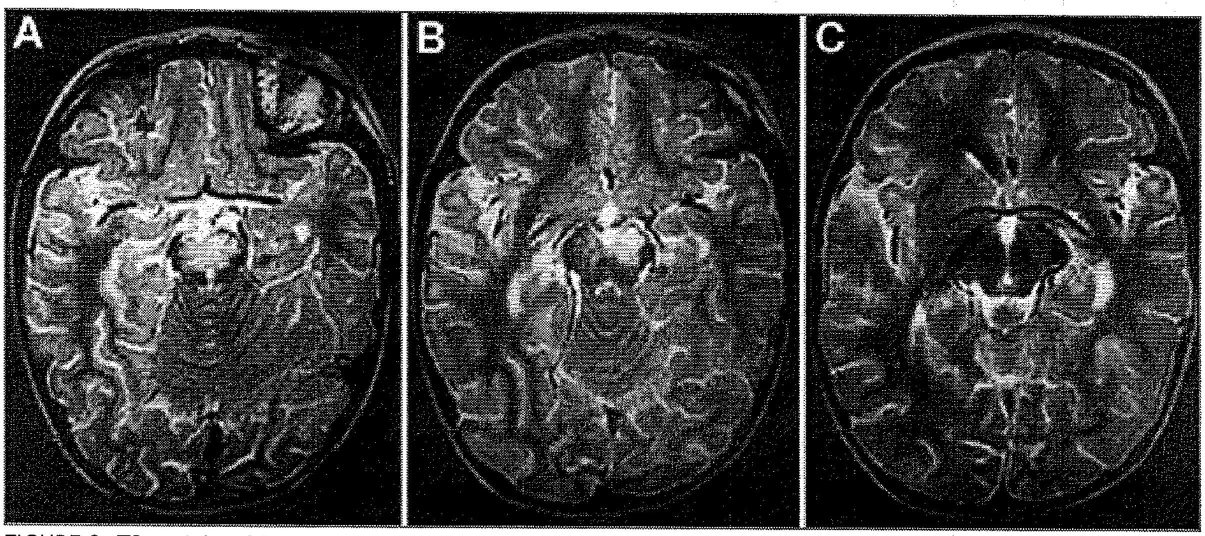

FIGURE 8. T2-weighted MRI scans showing signal change in the ventral midbrain.

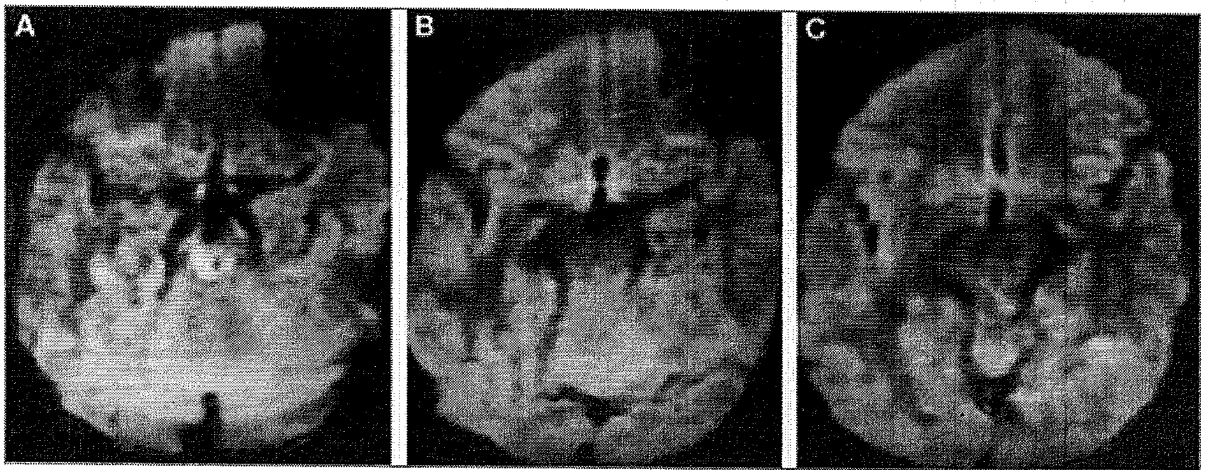

FIGURE 9. Diffusion MRI scans showing no evidence of infarction in the region of T2 midbrain signal change.

DISCUSSION

Third ventriculostomy was first advocated by Walter Dandy. The advent of the endoscope rendered this minimally i shunting in individuals with noncommunicating hydrocephalus (4, 5, 7-9). No surgical procedure, however, is risk free. include parenchymal injury, subdural hematoma, infection, failure, and subarachnoid and intraventricular hemorrhage BA injury with delayed aneurysm development and subarachnoid hemorrhage after endoscopic laser fenestration of the managed successfully with craniotomy and aneurysm clipping 1 month after the initial procedure. Others have reportec 7, 12, 13).

Anatomically, the BA apex lies within the upper interpeduncular cistern. In most individuals, the basilar tip lies at bony prominence, it is positioned closer to the base of the third ventricle. Hayashi et al. (6) measured the distance bet MRI scans in 217 individuals. The mean distance in those without hydrocephalus was 10.5 ± 2.3 mm, and it was 12 ± 3.7 was no difference between the two groups in this article, the authors point out that preoperative sagittal MRI scans car neurovascular structures that lie close to the third ventricle floor. In our patient, preoperative MRI scans revealed no al position on sagittal MRI scans, other investigators have looked into the use of intraoperative Doppler ultrasound to iden (3, 11). Although reports are limited, these authors have found micro-Doppler ultrasonography clinically useful.

In the above-reported case, basilar trunk injury occurred despite the use of a blunt probe with low monopolar curr that was positioned at least 14 mm above the posterior clinoid, thus the vessel apex was near the floor of the third ven exovascular clipping and endovascular embolization. We chose an endovascular approach because of its less invasive na aneurysm trapping along with direct aneurysm embolization caused by the presence of a left fetal PComA and a large ri posterior cerebral artery and bilateral SCAs. The development of high-quality digital imaging with roadmapping capabil steerable microwires has made it possible for endovascular surgeons to accurately deposit coils in a non-traumatic fash as the short distance between the rupture site, SCA origins, and more caudal short and long pontine perforators, made exclusion of this lesion from the native circulation. Had we simply placed coils within the false aneurysm, we risked me Hunterian ligation risked subsequent rupture from retrograde filling of the sac. It is our opinion that trapping provided

Because of the child's age and small femoral arteries, which possibly increased the risk of arterial injury during cat MRI/magnetic resonance angiography. A study performed 48 hours after embolization revealed aneurysm obliteration ai signal change within the midbrain without associated ischemic changes on diffusion MRI scans suggests that parenchyma

CONCLUSION

BA injury is a rare but reported risk of endoscopic third ventriculostomy. The development of a false aneurysm mal fragile and lethal nature of these lesions. New endovascular technologies now make it possible to consider treating the:

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COMMENTS

This is a single case report of a basilar artery (BA) perforation occurring as the result of and endoscopic third ventr
managed by use of endovascular coiling.

I am aware of at least one other similar case, which also was managed successfully with coiling. This represents a t
of endovascular techniques, even in selected infants. The concern in these cases is the possibility of delayed recanaliza
certain that the vessel remains occluded. This is probably the optimal method of treating this complication, when possi

Various techniques have been used to perforate the floor of the third ventricle, including "hot" wires, "cold" wires
and the endoscope itself. Each of these carries risk of damage to the BA and its branches.

Leslie N. Sutton

Philadelphia, Pennsylvania

Horowitz et al. describe their experience repairing a false aneurysm created of the upper basilar trunk after endos
authors indicated, that this procedure has a 5% complication rate; however, it is remarkable that this patient survived t
with BA occlusion and trapping of this false aneurysm, which clearly resulted in an excellent outcome. Occluding a BA c
individual had a fetal circulation on one side involving the posterior cerebral artery. I recommend performing a test occ
technology available, it may be possible to preserve the BA and either coil through the aneurysm or coil through the ste
repeated in other vessels. Nonetheless, the authors achieved an excellent outcome.

Robert H. Rosenwasser

Philadelphia, Pennsylvania

The authors describe a feared complication of endoscopic third ventriculostomy, namely, injury to the BA. In this c the Chiari I malformation developed hemorrhage from a false aneurysm of the upper BA trunk after endoscopic third ve subsequent endovascular trapping of the false aneurysm.

The present case is the second reported BA injury secondary to endoscopic third ventriculostomy reported by this i fenestration of the third ventricular floor. The present case occurred after fenestration by use of radiofrequency energ in reporting their complications. At the same time, I think they should change their operative technique. If the BA or it ventricular floor, they may be injured by the transmitted effects of laser or monopolar coagulation. Therefore, it is adv third ventricular floor. A variety of techniques are available to perform the third ventriculostomy. The safest is to perf opening with a balloon catheter. The location of the BA can be checked preoperatively on a sagittal magnetic resonanc

Alan R. Cohen

Cleveland, Ohio

The authors report the use of coils to trap a BA pseudoaneurysm that developed subsequent to the performance of to this challenging case. The use of coils to fill a pseudoaneurysm cavity is a suboptimal strategy. The coils are likely tc

The authors are fortunate that this child had adequate collateral supply to the basilar caput. Another alternative f placement of a stent, especially when the parent vessel cannot be sacrificed. Extreme care must be taken to avoid rup may be necessary to increase the metal-to-artery ratio and effectively occlude the pseudoaneurysm. In other vascular t

Demetrius K. Lopes

Chicago, Illinois

L. Nelson Hopkins

Buffalo, New York

Key words: Basilar artery; Endovascular; Guglielmi detachable coils; Hemorrhage; Third ventriculostomy

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IMAGE GALLERY

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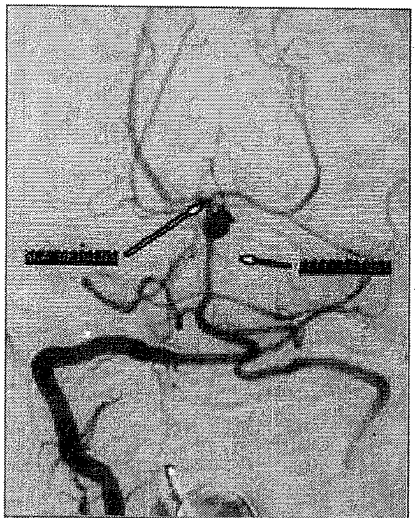


Figure 1

Figure 2

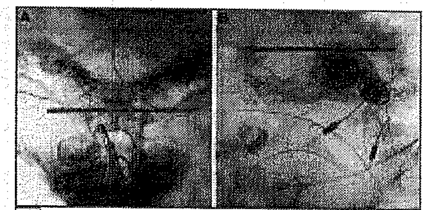


Figure 3

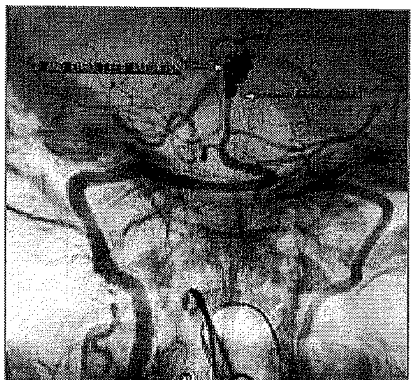


Figure 4

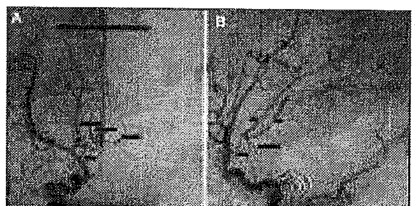


Figure 5

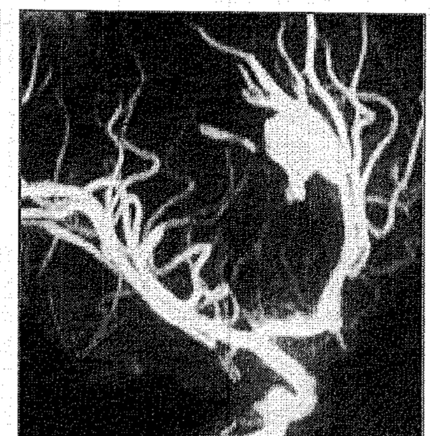
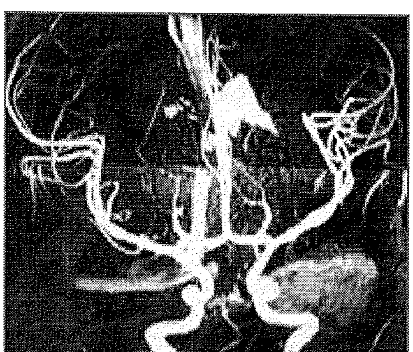


Figure 6



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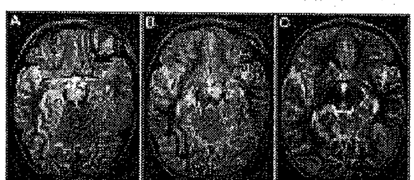

Figure 8

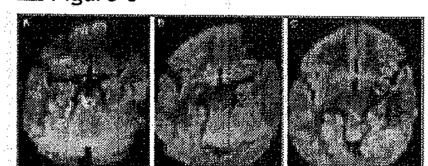

Figure 9

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