TABLE 1
Anatomical comparison of specimens of extradural PICAs

Authors & Year	Side	VA Origin	Distance (mm)*	VA Diameter (mm)	PICA Diameter (mm)
Salas, et al., 1998					
1st specimen	rt	inferomedial aspect	8	4	2
	lt	posteromedial aspect	11	4	2.5
2nd specimen	lt	superomedial aspect	12	5.5	3
Fine, et al., 1999	rt	posterior surface	7	5.5	2.5
	lt	posterior surface	6	5	2.2

* Distance between extradural PICA and the dural ring.

In our second anatomical specimen, radiographs were obtained in multiple standard and oblique projections. The lateral projection provided the most reliable delineation of the extradural origin of a PICA when close attention was paid to its relationship to the posterior aspect of the occipital condyle.[2] The histological sections of the left VA and left PICA at the dural entrance point from the first specimen demonstrated the separation of these arteries by a dense, fibrous, and paucicellular connective tissue (dura).[2]

Finally, we conclude that preoperative synthesis of both angiographic studies of PICAs and related neurovascular anatomy must be performed together to avoid complications due to this anatomical variation.

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3. Yaşargil MG: **Microneurosurgery.** Stuttgart: Thieme, 1984, Vol 1, pp 5–168

Response: Thank you for acquainting us with your excellent work. We are pleased that the *Journal of Neurosurgery* has published your letter providing the details of your study. Professors Yaşargil and Lang, as cited in your work, are two of the world's greatest neuroanatomists and we are not surprised that they have previously described the extradural PICA. Since submitting our paper, we have encountered two additional cases having an extradural PICA. Again, thank you for calling our attention to your excellent study.

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Colloid Cysts

To The Editor: Pollock and Huston (Pollock BE, Huston J: Natural history of asymptomatic colloid cysts of the third ventricle. *J Neurosurg 91:*364–369, September, 1999) are to be congratulated for an important contribution to the literature on colloid cysts of the third ventricle; however, I am concerned that the conclusions are insufficiently qualified and inadequately buttressed by their data.

Although the Mayo Clinic series is probably the largest in the world, the conclusion that patients with asymptomatic colloid cysts can be cared for safely with observation and serial imaging was based on a retrospective analysis of only 68 patients with incidental ventricular colloid cysts. The clinical follow up averaged between 6 and 7 years, and in one case, was only 7 months. Only two patients had follow-up imaging obtained 10 years following diagnosis. Only nine patients had cysts greater than 10 mm. The patients referred to this tertiary institution had an average age of 57 years and 31% had established ventriculomegaly. Note that in the previous report from the Mayo Clinic,[5] there was no surgery-related mortality in 55 patients. One patient in that earlier series was described who died from a colloid cyst without operation. He had presented in a comatose state; autopsy revealed a colloid cyst with a maximum diameter of 2.5 cm. In the current Mayo series of asymptomatic patients, one was a 57-year-old woman with an 8-mm lesion, which showed no change in cyst size after 8 to 9 years, but she acutely deteriorated and despite extraventricular drainage, she sustained severe neurological damage, which resulted in her death in a nursing home 4 years later.

Although the authors of this paper properly refer to the well-known propensity for colloid cysts to cause sudden death, that information tends to be submerged in their discussion and is not evident in their conclusions. The literature reveals numerous examples of sudden death from colloid cysts—many in coroners' series of people who did not reach the hospital in time, and often in children and young people.[1–21] These papers are a litany of repetitive tragedy marked by the vagueness of the symptoms and the brevity of the illness. Misdiagnoses abound. Medicolegal consequences seem likely. Even when patients do not die, frequently they present in a deteriorated condition and are hopelessly damaged. In one series[6] of 12 cases, four patients presented following acute neurological deterioration and only two recovered with prompt external ventricular drainage.

In the excellent study by Hernesniemi and Leivo[9] of a defined population in East Finland, the frequency of third ventricular colloid cysts was 3.2 cases per one million people per year, or 2% of all brain tumor cases. In their series of 40 cases, the five who died were victims of delay in diagnosis and presented in a moribund state. One of the five had a cyst with a diameter of less than 12 mm, and in the other four the diameters were between 1.3 mm and 2.5 mm. Even in that country, with an excellent medical care system and ready access to highly experienced neurosurgeons, it was estimated that 15 to 20% of patients with colloid cysts died because of failure of early diagnosis.

Pathology textbooks show many illustrations of colloid cysts. Some are obviously less than 1.5 cm in maximum diameter. In one neuropathological report of three cases of colloid cysts causing sudden death, a 34-year-old patient died with a 1.3-cm cyst, a 32-year-old died with a 0.9-cm cyst, and a 23-year-old died with a 1-cm cyst.[10] A series of eight autopsy cases from the Los Angeles County Hospital had an average age of 35 years (range 19–52 years) and

an average maximum cyst diameter of 20 mm (range 8.5–30 mm). The authors wrote, "No consistent pattern of symptoms or neurological abnormalities are apparent."[8]

In the literature review of Macdonald, et al.,[13] of 29 children with colloid cysts, seven died. They ranged in age between 6 and 17 years. The duration of illness was between 1 and 18 days, with three patients possibly having an even shorter course.

In a large Swedish series,[14] three patients who had not been treated previously for colloid cysts were admitted in a comatose state. Their medical histories ranged between 4 months and 5 years. Two of the three died and one had memory deficits following surgery. Two other patients, having had previous stereotactic aspirations, were also admitted in coma. The authors reported on seven patients with known colloid cysts who had been followed for 6 to 37 months. At initial diagnosis, the cysts ranged in size between 3 and 16 mm. At follow up, one cyst had increased 4 mm, two had increased 2 mm, and two had increased 1 mm. Only two showed no change.

In the 1986 review by Ryder, et al.,[18] of sudden deterioration and death in patients with benign tumors of the third ventricular area, 55 of the 56 documented cases were colloid cysts. When dimensions were known, 62% were less than or equal to 20 mm, 38% were less than or equal to 15 mm, and the smallest case was 10 mm. Of course, not all sudden, unexpected fatalities from brain tumors are due to colloid cysts. In 10,995 consecutive medicolegal autopsies, there were 19 unsuspected brain tumors, only one of which was a colloid cyst.[7]

The maximum diameter at which surgery is strongly recommended will vary from neurosurgeon to neurosurgeon, reflecting personal experience. Individual patient considerations will be critical. Having witnessed the appalling consequences of delay in surgery on several occasions, other things being favorable, I personally offer surgery to an asymptomatic patient under the age of 50 years with a cyst whose maximum diameter is more than 9 mm. I would also offer surgery to an older patient whose tumor was 10 mm or greater, although the presence of significant ventriculomegaly and cortical atrophy would tend to make me more conservative.

The lateral-to-fornix, transcallosal approach with a small incision seems remarkably well tolerated. Perhaps the deficit would be significant in professional musicians. Obviously, we have to be able to remove these lesions with an anticipated surgical morbidity and mortality less than than stemming from the natural progressive history: these surgical risks should be acceptable to the patient. No data exist to suggest that every colloid cyst should be subjected to surgery. Clearly, the Mayo Clinic information demonstrates that many patients can be safely followed. I would have been happier with Pollock and Huston's conclusions if they had written: "Despite the limitations inherent in a retrospective study of referrals to a tertiary institution, it appears that asymptomatic patients in whom colloid cysts are diagnosed who are elderly, have relatively small cysts, have ventriculomegaly, and live in an area with immediate access to expert neurosurgical treatment, can be safely treated with observation and serial neuroimaging." All patients and their families should be warned of the risk of catastrophic and sudden neurological deterioration, which cannot be completely predicted by serial, radiological monitoring. Patients should be told the size of their colloid cysts and informed of the fact that a majority of patients who die suddenly have cysts between 10 and 20 mm in maximum diameter.

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