Cerebellar Glioblastoma Multiforme; A Report of Two Cases and Review of the Literature

Tipu Zahed Aziz, BSc, MB BS, FRCS
Mark Stoddart BSc, MBBS
Department of Neurosurgery, University Hospital of Wales, Cardiff

SUMMARY
Cerebellar Glioblastoma Multiforme is a rare condition, a review of the world literature and two further cases are presented. Cerebellum, gliablastoma multiforme, surgery, radiotherapy.

INTRODUCTION
Cerebellar Glioblastoma Multiforme is rare, only 62 well documented cases have been found in the world literature. We report two cases treated in 1988 at the University Hospital of Wales, Cardiff (U.H.W.).

Case 1
S.W., a 69 year old male was admitted to the Neurosurgical Unit (U.H.W.) on 22.3.88 with a two year history of imbalance, occasional attacks of vertigo associated with nausea. In the two months prior to admission he began to complain of headaches and weakness of both legs but remained ambulant. On examination he had marked truncal ataxia, right sided dysdiadochokinesia, dysarthria and papilloedema. A CT scan (Fig. 1) showed an enhancing mass in the right cerebellar hemisphere with moderate lateral ventricular dilatation.

On the 29.3.88 at posterior fossa craniectomy an ill defined tumour was debulked. He made a good post operative recovery and underwent radiotherapy receiving 4000 Rads whole brain followed by 2000 Rads to the tumour bed. He died on 12.2.90, a CT scan prior to demise confirmed recurrent tumour. No autopsy was performed.

Case 2
A 55 year old male was admitted to the same unit on 30.8.88 with a three month history of unsteadiness of gait, falling to the left, occipital headaches and nausea. On examination he had horizontal nystagmus, left sided dysdiadochokinesia, an ataxic gait veering to the left but no papilloedema. A CT scan (Fig. 2) showed an enhancing mass in the left cerebellar hemisphere with lateral ventricular dilatation.

At posterior fossa exploration on 1.9.88 a soft greyish tumour was decompressed. He made an uneventful recovery and received 4500 Rads whole brain irradiation.

On 4.11.88 his general condition had deteriorated enough to merit re-admission to hospital and he died on 22.11.88. An autopsy was not performed.

PATHOLOGY
At the time of operation smears were made from both cases and stained with haematoxylin and eosin (H&E). Paraffin sections were also prepared and stained with H&E and PTAH (phosphotungstic acid haematoxylin).

The smear preparation from case 1 revealed pleomorphic poorly differentiated astrocytic cells and scattered giant cells; that from case 2, poorly differentiated malignant cells and occasional multinucleate cells. In each case a preliminary diagnosis of malignant astrocytoma (grade 3–4) was made.

Figure 1
CT scan of case 1 which shows the right cerebellar mass.

Figure 2
CT scan of case 2 which shows the left cerebellar lesion.
The paraffin sections of case 1 (Fig. 3) revealed a pleomorphic tumour with scattered multinucleate cells. There was marked endothelial cell proliferation and PTAH stains for glial fibres were strongly positive. Sections from case 2 (Fig. 4) revealed fragments of cerebellar tissue infiltrated by poorly differentiated pleomorphic tumour cells and numerous multinucleate cells. Endothelial proliferation was present but not as marked as in case 1. PTAH stains were markedly positive for glial fibres. In both cases a diagnosis of malignant astrocytoma (glioblastoma multiforme) of the cerebellum was made.

**DISCUSSION**

Cerebellar Glioblastoma Multiforme is rare, only 64 cases, including the present two cases, have been reported in the world literature (Table 1, refs. 1–21, 23–26, 28–37). The tumour is largely one of adult life but 23 cases have been reported below the age of 20 years (refs. 3, 6, 7, 12, 15, 16, 19, 21, 30). The male/female ratio is nearly 1:1, the average age of onset is 35.5 in females and 35.7 years in males. In patients under 20 years of age, the average age of onset is 11.9 years in males and 9 years in females with a male/female ratio of 1:1.

The survival rates, in weeks, for patients who have undergone surgery alone, including biopsy, partial and complete resection (SR), surgery followed by cranial irradiation (SR + RT) and surgery followed by irradiation and chemotherapy (SR + RT + CT) are shown in Table 2.

![Figure 3](image-url)  
A section of the tumour from case 1 showing endothelial proliferation, pleomorphic cells and scattered multinucleate cells (H&E. ×100).

![Figure 4](image-url)  
A section from case 2 showing pleomorphic cells with glial fibre formation. (PTAH, ×100).

### Table 1

| Author    | Year | Age | Sex | Site | Rx.  | Surv. |
|-----------|------|-----|-----|------|------|-------|
| Powell    | 1947 | 70  | M   | LH   | Nil  | ?     |
| Davis     | 1949 | 8   | M   | RH   | Nil  | ?     |
| Ringeritz | 1951 | 32  | F   | LH   | 164  |       |
| Roth      | 1960 | 42  | M   | LH   | Nil  | 7     |
| Huntington| 1965 | 32  | M   | LH,V | 33   |       |
| Masucci   | 1966 | 30  | M   | L,RH | BIOP. | 6   |
| Campanella| 1967 | 57  | M   | L,H,P,V | BIOP. | 5   |
| Gross     | 1968 | 49  | F   | V    | BIOP. | 18    |
| Tateishi  | 1969 | 65  | F   | LH   | Nil  | 15    |
| Wieczorek| 1971 | 60  | F   | LH   | 13   |       |
| Dohrmann  | 1975 | 55  | F   | RH   | PR + RT | 40 |
| Miller    | 1976 | 67  | M   | RH   | BIOP. | 7     |
| Fresh     | 1976 | 9   | F   | LH   | CR + RT + CT | 130 |
| Kleinman  | 1978 | 53  | F   | RH   | PR   | 5     |
| Tamura    | 1979 | 39  | F   | V    | PR + RT | 10  |
| Tibbs     | 1980 | 49  | F   | RH   | PR + RT + CT | 15 |
| Lucarelli | 1980 | 34  | F   | RH   | PR + RT + CT | 130+|
| Aun       | 1981 | 58  | F   | V    | BIOP. | 4     |
| Auff      | 1981 | 54  | F   | L,H,V,P | Nil | 15+ |
| Escolona  | 1981 | 51  | M   | L,RH,V | BIOP. | 2    |
| Salazar   | 1981 | 8   | F   | Not spec. | SR + RT | 55   |
| Kopelson  | 1982 | 15  | M   | PR + RT | 470  |
| Nasser    | 1983 | 21  | F   | RH,V | PR + RT + CT | ? |
| Hegehus   | 1983 | 39  | F   | RH,V | PR + RT + CT | 290 |
| Chin      | 1984 | 14  | F   | V    | CR + RT | 156 |
| Pombo     | 1985 | 9   | F   | RH   | BIOP. | 1     |
| Yamada    | 1986 | 55  | M   | RH   | SR + RT + CT | 190 |
| Inbasekaran| 1986 | 8   | F   | V    | PR   | 1     |
| Levine    | 1987 | 80  | F   | V    | CT + RT | 210 |
| Schmidtauer| 1987 | 21 | M   | RH   | CR + RT + CT | 104 |

**Abbreviations:**

SURV. survival in weeks from presentation to death.  
Rx. treatment.  
CR complete resection.  
PR partial resection.  
SR surgical resection, no details given.  
BIOP. biopsy only.  
RT radiotherapy.  
CT chemotherapy.  
LR, RH left and right hemispheres.  
V vermis.  
P, IV pontine, forth ventricle.
The two cases presented were treated by subtotal resection followed by radiotherapy. The radiotherapy protocols were different in each case. J.T. survived 13 weeks and S.W. 115 weeks after surgery.

Surgery alone can do little to improve survival but when combined with radiotherapy the results are encouraging, particularly since radiotherapy has been shown to increase the survival time and the tumour free interval in supratentorial glioblastoma multiforme (ref. 27). Radiotherapy schedules are often dictated by personal and local preferences. We support the views of Kopelson (refs 18, 19) who recommends posterior fossa irradiation only. The biological behaviour of these tumours would seem similar to that of the brain stem glioma in that they are locally invasive (ref. 22), and therefore, the risk of exfoliation and distant neuraxial spread, so characteristic of ependymomas and medulloblastomas, is very low. The regimes of total cranio-spinal irradiation in such cases would appear to be excessive.

The role of chemotherapy is less clear. It would appear from the survival figures (table 1) that this may have a useful effect. The studies of the EORTC brain tumour group (refs. 9, 10) have shown that CCNU may extend survival in patients with supratentorial glioblastoma multiforme in conjunction with surgery and radiotherapy.

For all treatment protocols, patients over the age of 60 years generally do less well than younger ones when the average figures, in weeks, of different age groups are examined (table 3).

Ten cases had no treatment and in three cases no survival figures were quoted. A statistical comparison of the various modes of therapy could not be performed as the regimes varied so widely.

CONCLUSION
It may well be that glioblastoma multiforme of the cerebellum is a distinct condition from the supratentorial form. Although histological sections suggest them to be identical, the tissue culture studies of Escalona-Zapata (ref. 9) suggest that it may arise from cerebellar astrocytes in a selective fashion. It may explain the inconsistencies of this curious but difficult neurosurgical enigma.

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Intra-ocular Lenses for Cataract Patients

Neil L. Dallas, TD, FRCS
Consultant Ophthalmologist, Bristol Eye Hospital

1989 was the 40th anniversary of intra-ocular lens implantation. Harold Ridley performed the first implant for cataract surgery in November 1949 at St. Thomas' Hospital. The idea developed on the following lines: It was known that trauma from plastic imbedded in the eye was inert, a situation seen mainly in air pilots who had suffered injuries from shattered wind screens. But the seed was sown by a medical student who was watching his first cataract operation, and enquired whether a plastic lens could be re-inserted after the crystalline one had been removed. It required a touch of genius to develop this, and Harold Ridley, with the co-operation of Rayner Optical, manufactured such a lens.

The visual results were dramatic. Up until then, cataract patients had been faced with thick magnifying lenses with distorted peripheral vision, the alternative being an uncomfortable contact lens, at that time in their infancy.

The operation, however, suffered complications, and although the new procedure was welcomed by many, it went through a period of bitter controversy which continued until at least the mid seventies. Ophthalmologists are a conservative group and many considered implant surgery as too dangerous to the patient's eye. For at least 10 years, therefore, Harold Ridley made few converts, and none of these were to be found amongst his colleagues at Moorfields. He very nearly abandoned the whole procedure. Let us see why.

The original IOL implant was a spherical lens, 9 mm. in diameter, placed behind the iris where the crystalline lens had been removed. It was heavy and sometimes dislocated, or by pressure, caused glaucoma. Later, some corneas became cloudy as a result of operative damage (the Perspex CO or polymethylmethacrylate is known to be hydrophobic and, therefore, a potential danger to the corneal endothelium). Later, an anterior chamber lens was designed and perfected over many years by Peter Croyce in Southend. This IOL was optically sound and did not dislocate. It did, however, continue to cause some corneal decompensation. The number of implant surgeons remained few and far between, most of them in the U.K. or the Netherlands.

In the 1960s, Cornelius Binkhorst produced a pre-pupillary lens with loops on either side of the iris to prevent dislocation. This operation was regarded as safer and by his scrupulous attention to detail, Binkhorst persuaded many colleagues to adopt the technique. Complications remained somewhat higher than in a plain cataract extraction, and by now more suitable contact lenses were available, including the extended wear soft ones.

Further changes occurred in the late 1970s. Micro-surgery was introduced, a visco-elastic substance named Healon could protect the surfaces of the plastic lens, and Kelman in the U.S. designed a phako-emulsification machine which could dissolve and wash-out the cataract through a small incision. The next generation of intra-ocular lenses, however, were again in the posterior chamber, but smaller and more physiologically acceptable to the eye. The posterior lens capsule had, of course, to be left intact to support the IOL. Only in 1978, therefore, did the numbers of implantations rise dramatically, principally because it was regarded as a safe and acceptable procedure in the U.S. Even in the U.K., the birthplace of the IOL, less than 10% of surgeons were prepared to implant eyes after cataract removal. I am glad to say that Bristol did better than that. C. A. Brown and Philip Jardine were experienced implant surgeons before I arrived in 1964; other colleagues were "occasional" implanters.

What is the state of intra-ocular lenses now? Over 100,000 IOLs are implanted each year in this country and well over 1,000,000 in the U.S. Nearly all eyes with cataract are suitable for IOLs and receive them. The operation has few complications and is one of the most successful operations in the world. This is just as well as, with an aging population, more and more cataract operations are carried out each year.

What of the early protagonists? Harold Ridley was made an FRS in 1988, and only the second ophthalmologist to be so honoured.