Postgraduate Medical Journal (1986) **62**, 623–626

Pituitary apoplexy and haemorrhage into adenomas

P. Tsitsopoulos, J. Andrew and M.J.G. Harrison

Department of Neurological Studies, Middlesex Hospital Medical School, Mortimer Street, London W1N 8AA, UK.

Summary: A review of 78 cases of surgically managed pituitary adenomas revealed that haemorrhage had occurred in 13. Frank haemorrhage or haemorrhagic infarction caused increasing headache, drowsiness, diplopia and visual failure. The correct diagnosis was suggested by skull X-rays and contrast studies leading to prompt surgical decompression.

Introduction

The term pituitary apoplexy is applied to two different situations. In the first, infarction of a non-tumorous pituitary leads to hypopituitarism, for example after a post-partum haemhorrage (Sheehan & Summers, 1949). In the second, haemorrhage or haemorrhagic infarction leads to sudden expansion and destruction of a pituitary adenoma. Whilst such haemorrhages can be asymptomatic (Wakai *et al.*, 1981) or have only mild clinical effects (Mohanty *et al.*, 1977) life threatening acute neurological deterioration may result (Bleibtrew, 1905).

The present study was carried out to review the frequency of haemorrhage in a consecutive series of cases of pituitary adenomas referred to one of us (JA) for neurosurgical management, and to investigate the clinical manifestations of this complication.

Materials and methods

A retrospective case note survey was carried out of 78 cases referred for surgical management. All but one had transcranial surgery, and evidence of haemorrhage into the tumours was sought from the operative findings and the histological reports. In the one unoperated case, post-mortem histology was available 2 years after presentation.

Results

Of the 78 patients 51 were male. Their ages ranged from 21 to 84 years. The majority proved to have a chromophobe adenoma (62) whilst 11 had a chromophilic adenoma. In the others the cell type was mixed or indeterminate.

Haemorrhage was identified in 13 patients (Table I). This appeared to be of recent origin in 7. In one case it followed an air encephalogram. The ages of these 13 patients varied from 24 to 73 with no evidence that haemorrhage was more common in the elderly. Females predominated 8:5, a significant excess of females (χ^2 4.98 $P < 0.05$). There was no evidence of any increased risk of bleeding into any particular type of adenoma. Thus the ratio of chromophobe to chromophilic tumours was similar in this sub-group to that in the larger population (7:2 cf. 55:9 n.s.).

Headache was the commonest clinical symptom at presentation being prominent in 11 of the patients. It had often been present for 1 to 3 months, but in all but one, an exacerbation was recorded of recent onset (<1 week). In 9 of the patients the deterioration was of sudden onset arising within 24 hours of presentation. Its severity led to the search for medical attention. Its abrupt onset mimicked subarachnoid haemorrhage or as in the case of one patient who was febrile, meningitis. The headache was usually fronto-temporal in site, always bilateral, and accompanied by nausea. Most of the patients were drowsy (8) and 6 complained of sudden onset of diplopia. Ten patients described some visual impairment consisting in 5 of a sudden reduction in visual acuity. Four reported a sudden impairment of their visual field.

At examination all but 5 showed some depression of consciousness. Fundoscopy revealed none to have papilloedema but 5 had optic atrophy which was severe in 2. The visual acuity was impaired in all but 3, and three were virtually blind with appreciation of light or the ability to count fingers only. Six patients showed a bitemporal hemianopia. Two had normal fields to confrontation. The others appeared to have

Correspondence: M.J.G. Harrison, D.M., F.R.C.P.
Accepted: 27 February 1986

Table I Presenting features

Case	*Sex*	*Age*	*Headache*	*Diplopia*	*Drowsiness*	*Ocular palsy*	*Impaired vision*	*Abnormal visual field*
1	F	55	+	+	−	+	+	+
2	M	60	+	−	−	−	+	+
3	M	45	+	−	+	−	+	+
4	F	35	+	+	++	+	+	+
5	F	67	+	+	++	+	+	+
6	F	43	+	−	−	−	+	+
7	F	23	+	−	+	−	−	+
8	F	63	+	+	++	+	+	+
9	M	73	+	−	+	−	+	+
10	F	32	−	−	−	−	−	−
11	M	48	+	+	+	+	+	+
12	F	24	+	−	−	−	+	+
13	M	69	−	+	+	+	−	−

temporal or nasal scotomatous defects but accurate assessment in the severely drowsy patients was very difficult.

In 3 patients there was a total ophthalmoplegia which in two instances was bilateral. No eye movements could be produced in response to command or the doll's head manoeuvre. Two other patients had an isolated sixth nerve palsy and one a third nerve lesion.

Nine patients proved to have had severe hypopituitarism; in 4 others the defects were partial and 4 had elevated prolactin levels. Endocrinological features were obvious at the bedside from the history of amenorrhoea, infertility, galactorrhoea, loss of libido, or loss of body hair in 5 instances. Hypotension was recorded in 4 of those with a sudden presentation.

The neuroradiological examination consisted of skull X-rays in all, air encephalography in 9 and computed tomographic (CT) scans in 5. Eight patients also had carotid angiography. The skull X-rays showed an enlarged sella in 9. In 2 patients there was erosion of the sella of undetermined origin, and 2 patients had a normal sella. A suprasellar extension of the tumour was revealed in each air encephalographic study carried out. CT scans (Figure 1) revealed an enhancing mass arising out of the sella in 3, and a mass within the sella in two, one of which showed enhancement. One patient was rescanned after an interval of a month. The later scan showed loss of the earlier enhancement but enlargement of the tumour, a change attributed to infarction in the tumour.

At surgery ($n = 12$) recent haemorrhage was present in 7. Old haemorrhage was obvious in 3. In 2 cases the tumour appeared infarcted or necrotic but histological examination also revealed evidence of haemorrhage. The post mortem, 2 years after presentation, revealed evidence of old bleeding.

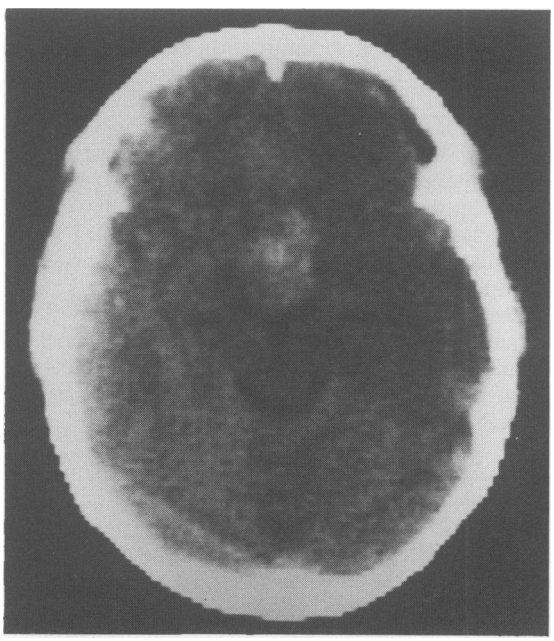

Figure 1 CT scan with contrast showing an enhancing mass arising in the sella.

Postoperatively most patients had transient diabetes insipidus. One developed a communicating hydrocephalus which required shunting. By 6 months follow-up all reported the absence of headache or diplopia. Visual acuity had improved in 8 (Table II). Visual fields were restored fully in 6. Disc pallor was unchanged. Ocular movements were full or virtually so in all cases (Table III). All were on hormonal replacement therapy.

Table II Effect of surgery for pituitary apoplexy on visual acuity changes

Case	Visual acuity Pre-op	Post-op	Change
1	J6/J6	J4/J4	Improved
2	J2/J8	J2/J8	Unchanged
3	J3/J3	J3/J3	Unchanged
4	Near blindness (PL)	J2/CF	Improved
5	NPL/CF	NPL/J2	Improved
6	CF/6/9	6/60/6/9	Improved
7	'Normal'	'Normal'	Unchanged
8	NPL/NPL	J18/J2	Improved
9	J12/J18	J2/J18	Improved
10	'Normal'	'Normal'	Unchanged
11	J2/J4	J2/J2	Improved
12	6/9/6/12	6/6/6/6	Improved
13	'Normal'	'Normal'	Unchanged

CF = counting fingers; PL = perception of light; NPL = no perception of light; J figures refer to Jaeger reading types; 6/9, etc. refer to Snellen chart.

Discussion

This survey has shown that haemorrhage into pituitary tumours is not uncommon (16.5% of pituitary tumours referred for surgery). Some reports have claimed that eosinophilic adenomas are particularly vulnerable to haemorrhage but our study does not support this. Our figures suggest a female predominance but this is not a universal finding (Lopez, 1970; Wakai *et al.*, 1981). Haemorrhage appears to be secondary to infarction in the adenoma in some cases. One of our cases showed serial CT changes suggestive of such infarction and 3 others showed necrotic changes histologically. Rupture of thin walled vessels in a rapidly enlarging tumour has been proposed as another mechanism (Mohanty *et al.*, 1977). One of our patients had a very vascular tumour with frequent mitotic figures suggestive of rapid growth, but we also saw bleeding in 2 small tumours (Wakai *et al.*, 1977). Haemorrhage may occur after air encephalography as in one of our cases. Enhancement for CT scanning might also be a cause for deterioration but we saw no direct evidence of this.

There has been some debate about the mechanism of symptom production. Headache can presumably be caused by a rapid increase in size of an adenoma, or its infarction or haemorrhage. This causes stretching of the dura on the wall of the sella and meningeal irritation. Sudden increase in lateral extension into the cavernous sinus accounts for the ophthalmoplegia and sometimes even a proptosis. Increased upward extension of an adenoma causes visual field defects and/or a fall in visual acuity. Rarely the internal carotid artery is compromised and a hemiplegia results. If blood from haemorrhage into the pituitary, or haemorrhagic infarction of the adenoma leaks into the cerebrospinal fluid drowsiness and meningism may occur. An alternative explanation for the drowsiness in some cases may be direct hypothalamic disturbance since acute swelling of the hypothalamus was visible in at least 3 of our operated cases whose conscious level had been depressed preoperatively.

Headache is the commonest symptom in cases with haemorrhage into an adenoma and this is often of sufficient severity to suggest a subarachnoid haemorrhage, though the headache has usually been present for some weeks before its rapid crescendo deterioration. Drowsiness is common but does not help in the differential diagnosis and may rather suggest a chronic subdural haematoma. Visual symptoms provide the main clue to the correct diagnosis with a fall in visual acuity and the sometimes sudden development of a field defect or ophthalmoplegia. If loss of body hair

Table III Abnormalities of eye movements pre and post-surgical treatment of pituitary apoplexy

Case	Eye movements Pre-op	Post-op
1	R. VI palsy	Normal
2	Normal	Normal
3	Normal	Normal
4	R&L Total ophthalmoplegia	Mild convergent squint
5	L Total ophthalmoplegia	Mixed L. VI weakness
6	Normal	Normal
7	Normal	Normal
8	R&L Total ophthalmoplegia	Mild divergent squint
9	Normal	Normal
10	Normal	Normal
11	R VI palsy	Normal
12	Normal	Normal
13	L III palsy	Normal

and/or gynaecomastia are found, hypopituitarism is suggested and this directs attention to the correct diagnosis in a drowsy sick patient, even when visual symptoms cannot be elicited. Diabetes insipidus is a rare accompaniment of sudden expansion of the pituitary with impaired blood supply to the supraoptic nucleus and posterior lobe.

Plain X-rays and CT scanning with enhancement are sufficient to make the diagnosis in the majority of cases. A ring enhanced lesion in the pituitary with a low density centre is suggestive of pituitary apoplexy (Post *et al.*, 1980) as long as the patient has not had previous irradiation of the pituitary. Rarely a fluid level of blood density is seen in the pituitary (Fujimoto *et al.*, 1981).

Surgery is usually required though haemorrhage occasionally causes destruction of an adenoma and diplopia or field defects may than recover spontaneously (Rovit & Fein, 1972). It has been suggested that it is safe to wait 24 hours to see if visual loss will recover spontaneously before evacuating the haemorrhagic necrotic contents of the sella (Robinson, 1972). However visual loss may be permanent and fatal midbrain haemorrhage may follow (Ebersold *et al.*, 1983), so prompt decompression under steroid cover is recommended whenever such acute clinical change suggest that pituitary apoplexy has occurred. Decompression might be safer by the transnasal route in an ill patient. The soft necrotic and haemorrhagic material would be easily removed. If consciousness is retained and vision is intact, or if the patient is not seen until some time has elapsed after the sudden change, a conservative policy seems appropriate. Careful evaluation of the hormonal status and replacement therapy then suffice (Reid *et al.*, 1985).

Acknowledgements

We are grateful to Dr H.C. Grant and Professor P. Lantos for the neuropathological studies and Dr B.E.Kendall for neuroradiology.

References

BLEIBTREW, L. (1905). Ein Fall von akromegalie (Zerstrorung der Hypophysis durch Blutung). *Münchener medizinische Wochenschrift*, **52,** 2079.

EBERSOLD, M., LAWS, E., SHEITHAUER, B. & RANDALL, R. (1983). Pituitary apoplexy treated by transsphenoidal surgery: a clinical and immunocytochemical study. *Journal of Neurosurgery*, **58,** 315.

FUJIMOTO, M., YOSHINO, E., HEGUCHI, I., MIZUKAWA, N. & HIGAKAWA, K. (1981). Fluid blood density level demonstrated by computerised tomography in pituitary apoplexy. *Journal of Neurosurgery*, **55,** 143.

LOPEZ, I. (1970). Pituitary apoplexy. *Journal of Oslo City Hospital*, **20,** 17.

MOHANTY, S., TANDON, P., BANERJI, A. & PRAKASH, B. (1977). Haemorrhage and pituitary adenomas. *Journal of Neurology, Neurosurgery and Psychiatry*, **40,** 987.

POST, M., DAVID, N. & GLASER, J. (1980). Pituitary apoplexy diagnosis by computer tomography. *Radiology*, **134,** 665.

REID, R.L., QUIGLEY, M.E. & YEN, S.S.C (1985). Pituitary apoplexy. A review. *Archives of Neurology*, **42,** 712.

ROBINSON, J. (1972). Sudden blindness with pituitary tumours. Report of three cases. *Journal of Neurosurgery*, **36,** 83.

ROVIT, R. & FEIN, J. (1972). Pituitary apoplexy: a review and reappraisal. *Journal of Neurosurgery*, **37,** 280.

SHEEHAN, H.L. & SUMMERS, V.K. (1949). The syndrome of hypopituitarism. *Quarterly Journal of Medicine*, **42,** 319.

WAKAI, S., FUKUSHIMA, T., TERAMOTO, A. & SANO, K. (1981). Pituitary apoplexy, its incidence and clinical significance. *Journal of Neurosurgery*, **55,** 187.