All except one patient achieved bilateral central fixation, the majority of the squints becoming alternating in type, with equal visual acuity.

In over half the patients a temporary stage occurred in which the non-central fixation and the squint were transferred to the originally fixing eye.

The excellence of these results is ascribed to the fact that none had had any previous treatment, the majority attending for treatment at a relatively early stage after the onset of the squint, and, perhaps even more important, to the intensive and rigorous nature of the occlusion used.

I thank the surgeons of the Manchester Royal Eye Hospital for their reference of cases for study and treatment.

REFERENCES

- Bangerter, A. (1953). *Ophthalmologica (Basel)*, **125**, 398.
 Cüppers, C. (1958). "Orthoptic and Pleoptic Problems in Germany." Lectures to the North of England Ophthalmological Society, June 12 and 13, 1958.
 Graham, P. A. (1961). *Brit. orthopt. J.*, **18**, 1.
 Mayweg, S., and Massie, H. H. (1958). *Brit. J. Ophthalm.*, **42**, 257.
 Scully, J. (1961). *Ibid.*, **45**, 741.
 — and Naylor, E. J. (1961). *Brit. med. J.*, **2**, 81.
 Sutcliffe, S. (1958). *Brit. orthopt. J.*, **15**, 86.

INTRAOCULAR HAEMORRHAGE AFTER EPIDURAL INJECTION

BY

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In view of the interest in epidural injection shown in the correspondence columns of the *British Medical Journal* during the first half of 1961, we record the case histories of two patients referred to us because of the occurrence of subhyaloid haemorrhages following epidural injection.

Case Reports

Case 1.—A woman aged 36 gave a nine-year history of left lumbar backache, extending to the left leg. This followed childbirth. Examination revealed lumbar pain on extension and right lateral flexion of the spine. The straight-leg-raising test was positive on the left side but there were no other abnormal signs. X-ray examination showed narrowing of the disk space between L4 and 5, with bilateral sacralization of the fifth lumbar vertebra. On July 9, 1958, under general anaesthesia, an epidural injection of 120 ml. of isotonic saline was given, followed by manipulation of the spine by extension only. On recovery from the anaesthetic the patient complained of blurring of vision of her right eye and headache. Examination of the fundi revealed multiple retinal haemorrhages in the right eye at the pole and adjacent to the disk, several of which were subhyaloid in type. A month later, as these were still present, a lumbar puncture was carried out, with normal findings. Blood-pressure, Hess test, and bleeding, clotting, and prothrombin times were all normal, as were the blood and platelet counts. When we last saw her, in May, 1961, all haemorrhages had disappeared, but a pigmentary disturbance persisted at the right macula and her right visual acuity was reduced to 6/24. The left vision was 6/5.

Case 2.—A woman aged 39 had a six-months history of low lumbar pain radiating to the left leg. Examination showed no deformity but general limitation of movements of the lumbar spine. There was a slightly positive left straight-leg-raising sign, but the lower limbs were otherwise normal. X-ray films showed slight narrowing of the lower two lumbar disk spaces but more severe disk degeneration in the lower thoracic spine. On December 21, 1960, under general anaesthesia, an epidural injection of 120 ml. of isotonic saline was given, followed by manipulation in extension only. Next day she complained of blurred vision in her left eye, with uniocular diplopia in the right eye. Examination showed a retinal haemorrhage close to the right macula, but a very extensive left subhyaloid haemorrhage spreading infero-temporally from the disk and just involving the macula. In spite of bed rest, this latter broke forward to produce a full vitreous haemorrhage with reduction of vision to perception of light only. When she was last seen, in May, 1961, the right fundus was normal,

with 6/5 vision, but there was still a large left vitreous haemorrhage, although the vision had recovered to 6/6.

Discussion

It seems likely that the main factor causing the intraocular haemorrhages in these cases is the sudden rise in intracranial pressure. In both cases the spinal symptoms were completely relieved by the injections.

Evans (1930) demonstrated in the cadaver that epidural injection of 100 ml. of dye-stained gelatin solution reached as far as the upper cervical region. Kelman (1944) pointed out that sudden distension of the epidural space causes acute compression of the subarachnoid space, with sudden rise of the C.S.F. pressure, as shown by simultaneous cisternal and spinal readings. Evans demonstrated in a patient by simultaneous readings from a lumbar puncture needle that the C.S.F. pressure rose to 320 mm. of fluid during an epidural injection of 30 ml. of fluid. Injection of 120 ml. must therefore cause a very considerable rise of intracranial pressure, and the injection would have to be made very slowly indeed if this was to be avoided.

The optic nerve is surrounded by an extension of the subarachnoid space, and the central vein of the retina crosses this space as it leaves the optic nerve to join the orbital veins. The retinal blood circulation depends on the pressure in the central vein of the retina being a little higher than the C.S.F. pressure. A rise of the C.S.F. pressure is immediately reflected back to the retinal veins and capillaries. With a lowered intraocular pressure due to general anaesthesia and a possible rise in arterial blood-pressure caused by the rise in intracranial pressure, it is not surprising that retinal haemorrhages can occur. Retinal haemorrhages occurring in patients with subarachnoid haemorrhage may be similarly produced by a similar sudden pressure increase in the subarachnoid space caused by arterial rupture.

The main retinal vessels run superficially in the nerve fibre layer, and the smaller vessels and capillaries dip down into the retina. Haemorrhages of the latter may disrupt the retinal elements and cause permanent damage. Haemorrhages of the large superficial vessels may break forward through the internal limiting membrane, and, if still limited by the hyaloid face of the vitreous, will produce the characteristic subhyaloid haemorrhage—round with a flat top—rather like a half-

full carafe of burgundy. Further haemorrhage may cause a break-through of the hyaloid membrane, to produce a vitreous haemorrhage.

To avoid this serious complication, a slow rate of injection and limitation of the amount injected are obvious precautions. The development of a headache, due perhaps to the rise of intracranial pressure during the procedure, gives warning that the speed of injection needs slowing, but this guide is not available when a general anaesthetic is used. Further tests are necessary to determine how long the raised C.S.F. pressure lasts, but if this is not long, gentle pressure on the eyes through

the closed lids at the time of the injection would raise the intraocular pressure and help to support the distended retinal vessels.

Summary

Two cases of retinal haemorrhage apparently caused by epidural injection of saline are recorded, and it is concluded that they were produced by a sudden rise in cerebrospinal pressure causing acute retinal venous congestion.

REFERENCES

- Evans, W. (1930). *Lancet*, 2, 1225.
Kelman, H. (1944). *Amer. J. Surg.*, 64, 183.

MUMPS ARTHRITIS

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Though the occurrence of arthritis in epidemic parotitis is referred to in textbooks of joint disease (Hollander, 1960), paediatrics (Abt, 1925; Griffith and Mitchell, 1941), and infectious disease (Wesselhoft, 1951; Stimson and Hodes, 1956), the condition seems to deserve wider recognition.

Maisondieu (1924) credited Rilliet with first recording this condition in 1850, added 6 personal cases, and reviewed 12 others. Apart from one other case mentioned by Wesselhoft (1951), who alone quotes Maisondieu's paper, we have found reports of only eight additional cases (Wilson, 1926; Magida, 1951; Applebaum *et al.*, 1952; Senise *et al.*, 1957), bringing the total to 28 cases, of which four were in females.

Maisondieu's six cases of arthritis occurred among 1,334 cases of mumps, giving an incidence of 0.44%.

This paper presents three further cases of arthritis complicating mumps.

Case Reports

Case 1.—A boy aged 5 years suffered severe transient pain in the right ankle 12 days after the onset of parotitis. Two days later the left ankle became painful and he began to limp. This ankle was swollen, warm, and tender over the posterior and lateral aspect. Movement was limited by severe pain. The temperature was 100.6° F. (38.1° C.). Radiographs of both ankles were normal. The E.S.R. was 50 mm. in one hour (Westergren). The white-cell count was 8,100/c.mm., with normal differential count. The antistreptolysin O titre was normal. The titre to mumps virus was 1/128 to V and 1/64 to S antigen. Within three days all pain and swelling had subsided.

Case 2.—A boy aged 5 years complained of severe pain in the left thigh, made worse by coughing, two weeks after the onset of parotitis. There was tenderness in the left groin with severe muscle spasm on attempted movement of the left hip. The temperature was 100.4° F. (38° C.), and fever continued for seven days. A diagnosis of arthritis of the left hip was made and penicillin was given. Salicylates were administered, but there was no immediate relief of pain or resolution of fever. The total white-cell count on the second day after onset of hip pain was 18,000/c.mm., and on the sixth day 7,000/c.mm., with normal distribution. On the third day abdominal pain and vomiting suggested the possibility of appendicitis, but these symptoms subsided without operation. The abdominal symptoms may have been due to mumps pancreatitis, especially as tenderness

persisted in the left hypochondrium for a few more days. The patient was discharged on the fourteenth day free from pain and with full hip movement.

Case 3.—A man aged 43 suffered bilateral parotitis at the same time as one of his sons and two weeks after another son had been affected. Two weeks after the onset of parotitis he developed fever, nausea, and headache and complained of pain and swelling of the left ankle, which confined him to bed. Two days later the left ankle showed slight residual swelling and tenderness. The patient then developed a severe left orchitis. The white-cell count was 14,000/c.mm. (polymorphonuclear leucocytes 89%). The E.S.R. was 34 mm. in one hour (Westergren). The mumps titre was less than 1/4 to V and less than 1/16 to S antigen. Two weeks later it had risen to diagnostic level, being 1/64 to V antigen. The joint recovered fully.

Discussion

In the reported cases arthritis showed a male predominance of seven to one. Other complications of mumps also show a predilection for the male, notably mumps paralysis (Lennette *et al.*, 1960), in which all 11 patients were boys. The age incidence was 11 to 47 years. Onset was from 8 days before to 29 days after the parotitis, and the duration was between two days and two months. One or many joints were involved and recovery was complete.

When performed blood sedimentation rates were found to be increased and complement-fixation or viral-agglutination titres were diagnostic. Usually a polymorphonuclear leucocytosis was found.

Mumps virus has been recovered from the saliva and urine (Utz *et al.*, 1957), thyroid (Eylan *et al.*, 1957), and cerebrospinal fluid (Lavergne *et al.*, 1937), and was found in the blood by Woolstein (1918). We can find no reference to isolation from the joint. Nevertheless, the arthritis may be due to viral infection of the joint, for it occurs commonly at the same time as other complications in which the virus has been recovered from the affected organ or system. It is our intention, when next we meet this complication, to attempt to grow virus from the joint.

Summary and Conclusions

Three cases of arthritis complicating mumps are reported, and the literature is reviewed.