particularly interesting in view of the extensive nature of the coronary and intramyocardial arterial disease.

The epileptiform seizures in the advanced stage of the illness could not be associated with any detectable cerebral, arterial, or other primary intracranial disease. It is surprising, in view of the considerable renal arterial disease, that no further indication than a mild albuminuria was present, and that the blood urea was only 44 mg. per 100 c.cm. The absence of pain in relation to the abdominal viscera is notable; possibly the absence of any arterial haemorrhages or extensive thrombosis explains this latter phenomenon.

Summary

It is evident from a study of the literature and the cases outlined in this paper that the clinical disorder known as rheumatic fever is essentially a disease affecting numerous structures in the body, but with special affinity for damaging the cardiac and arterial structures. The association suggested regarding a common aetiological

agent in these cases is evident, and in the light of recent records it would appear that whereas streptococcal infection or toxæmia in rheumatic fever may confine the tissue damage to certain individual structures—for example, heart valve or nervous system—in other cases a variable degree of severe arterial disease may occur and render itself apparent by any of the symptoms by which periarteritis nodosa is recognized. The possible grave prognostic importance of these latter phenomena is indicated in the cases here discussed.

We are grateful to our senior physician, Dr. Mackey, for his permission to use the case records.

BIBLIOGRAPHY

- Klotz: *Trans. Assoc. Amer. Physicians*, 1912, xxvii, 181.
 MacCallum: *Bull. Johns Hopkins Hosp.*, 1924, xxxv, 329.
 Pappenheimer: *Amer. Journ. Path.*, 1926, ii, 235.
 Idem: *Ibid.*, 1927, iii, 583.
 Shaw, B.: *Arch. Dis. in Child.*, 1929, iv, 154.
 Fraser, A. D.: *Ibid.*, 1932, vii, 181.
 Rothstein and Welt: *Amer. Journ. Dis. Child.*, 1933, xlv, 1877.
 Bennett and Levine: *Amer. Journ. Med. Sci.*, 1929, clxxvii, 853.

INFLAMMATORY DISLOCATION OF THE ATLAS

BY

DUNCAN C. L. FITZWILLIAMS, M.D., F.R.C.S.

(With Special Plate)

We are all familiar with the curious sequences of cases which sometimes occur in practice, but few people, I imagine, have had two boys walk into their consulting room one after the other with dislocated cervical vertebrae. Yet such happened to me. One was sent by a doctor in Peterborough, and the other by a doctor in Ilford. The cases were as follows.

Case I

A boy, aged 15, whom I saw on February 19th, 1932, was brought to me complaining of stiffness of the neck and pain on certain movements. He was a twin; his sister had died at birth. In July, 1931, he suffered from rheumatic pains in the neck, and in August the neck became stiff, bent to one side, and movements were limited in all directions. Since then movements had gradually improved, but were still limited, especially rotation. During July he had rheumatoid pains in ankles, knees, back, and shoulders, but these gradually decreased and were now rarely felt. About fourteen days previously, when sitting on the ground, his small brother, aged 6, fell against him and bent his neck forwards. The head, however, was in its present position before this accident. An x-ray photograph taken at Peterborough showed displacement of the atlas on the axis. Another taken at St. Mary's Hospital showed anterior dislocation of the left side of the atlas on the axis, with some downward displacement on that side.

EXAMINATION

So identical were the two cases that one description will do for them both. The head was inclined to the left shoulder and the chin directed to the right. The former seemed to be displaced slightly to the left side. It was held stiffly, and voluntary movements were very limited in extent; it could be rotated more to the right than to the left. Flexion was limited after a short excursion, and was painful. The pharynx seemed full, and a prominence could be felt on the posterior pharyngeal wall, especially on the left side slightly above the level of the soft palate, so that it was masked and had to be felt for.

TREATMENT

The condition was explained to the father, who refused to allow any active attempts at reduction. The head was immobilized and an extension apparatus applied with a weight and pulley. The patient was kept lying down in this

apparatus for ten weeks. At the end of this time the pain had disappeared, but the movements of the head, though freer, were still limited. In February, 1933, in a letter stating that the boy had begun to fail about a month after leaving the hospital, Dr. Clapham wrote: "He is gradually losing the use of his arms and legs, and has begun to stagger. He is now very thin, gets up from a chair like a pseudo-hypertrophic muscular paralytic, but can bend to his toes and rise up without climbing up his thighs. His deltoids are wasted, his grip feeble, and his interossei wasted. He has wrist-drop on the right side. My opportunity to overhaul him was limited. There is a swelling below his occiput." Unfortunately Dr. Clapham died, and his successor has not been able to trace the case.

Case II

A boy, aged 10, was brought to see me for stiffness of the neck and pain on moving the head. About four and a half months previously, enlarged glands had appeared in the neck, chiefly on the left side, after a feverish cold, which lasted a week. Hot fomentations were applied for three weeks. Then the patient had quinsy. Five weeks previously he suddenly developed a stiff neck, and held his head stiffly and would not move it. His tonsils were removed in King George's Hospital, as they were thought to be the cause of the trouble. This, however, did no good. The patient constantly supported his head in his hands, except when lying down. Examination proved that the case was exactly similar to the last one.

The x-ray report showed the atlas displaced forward on the axis on the left side—a subluxation. It was thought it might be a developmental error; there was no evidence of caries. His doctor, after I wrote to him, was still doubtful of dislocation, and took him to St. Bartholomew's Hospital, where my diagnosis was confirmed.

I thought that perhaps an injury had been done him while under the anaesthetic for the removal of his tonsils, but the history showed that the wry-neck was established before the operation, which had, in fact, been performed to cure the condition.

SUBSEQUENT PROGRESS

His father refused all treatment, and I did not see him again. I heard a year later that there was considerable improvement in the condition, but the wry-neck still persisted. On January 1st, 1933, Dr. Thomson Brown wrote to say that the patient was in excellent health, but the neck was still obviously dislocated. He had been taken to a bone-setter, who had wrenched his neck about and told him he would be well in six months. He did not improve, however. In January, 1934, Dr. Thomson Brown reported that in the preceding autumn the boy developed tuberculous glands on the left side of the neck. These were curetted in September, and the wry-neck completely disappeared while he was in hospital. The x-ray photograph now shows no signs of displacement.

The dislocation of the atlas vertebrae is very rare, and previously I had never seen a case apart from severe injury. Here, however, were two boys brought by their parents, who had no knowledge of the nature of the trouble.

Cases in the Literature

The condition was familiar from the writings of Grieg and from the excellent paper on the subject by Watson Jones in the *Proceedings* of the Royal Society of Medicine, (February, 1932). He could only find records of eighteen cases. Since that time, however, I have found other cases reported. In most of them the essentials of the history are absent, as the true pathology was not recognized.

Age Incidence and Aetiology

The condition so far, with few exceptions, has been confined to youth, all but two cases occurring under the age of 20. The ages were: at 12 and under, twenty-one cases; at 13 and under, one case; at 15 and under, one case; at 17 and under, one case; at 22 and under, one case; over this age, two cases. In none of the cases was there a history of sufficient violence to cause the condition apart from other factors. Some of them have been dramatic in their suddenness. In one case a nurse was dressing tuberculous sinuses in connexion with the glands of the neck; to see better she gently turned the child's cheek with the back of her hand; the child choked, became cyanosed, and died. Post-mortem examination revealed pressure on the spinal cord by the odontoid process (Reid).

In my first case operation had been performed upon the tonsils, and it was suggested that manipulations of the head, when the child was under the anaesthetic and when the muscles were relaxed, might have accounted for the dislocation. I carefully questioned the father, and he assured me that the stiffness had been noted before the operation, and that in fact it was the stiffness, which was then thought to be due to tonsillar inflammation, that decided him to have the operation performed. In Swanberg's cases the condition was noted after a tonsillar operation, which may have determined it. Fitzsimmons's second case was that of a girl of 8, who, in jumping, fell upon her head, and then had a marked infection of her throat, after which the condition was noted. The patients in Cases 3 and 4 of the same author were also said to have fallen on their heads; in Case 3 there is no mention of any inflammatory trouble, but in Case 4 large glands were noted in front of the sterno-mastoid. In each case the condition was attributed to the accident.

So far there have been thirteen females, sixteen males, and two cases in which the sex is not mentioned.

The Associated Inflammation

This seems to be the dominating factor in all the histories. The inflammation has been in the nasopharynx, upper part of the neck, or near the base of the skull. In youthful patients the inflammation has obviously been of the acute type, situated in the region of the nasopharynx—namely, "sore throat," tonsillitis from various causes, or adenitis of the upper cervical glands; in one case there was periostitis of the mandible (Wittek), and in two cases acute mastoiditis. In older patients both tubercle and syphilis have accounted for the condition. Stammers's case was an excellent example of tuberculous caries in a man of 30.

Pathology

This condition has no well-recognized name. Défosses called it the "maladie de Grisel," while others have invented many methods of describing it. Perhaps in-

flammatory dislocation of the atlas from axis describes it as closely as possible. Concerning the pathology there have been fewer suggestions. Wittek's suggestion that it was due to an inflammation of the tissue round the odontoid process is perhaps the most ingenious. Increased blood supply to a bone has always been associated with a certain amount of absorption of calcium from the bone. This is best seen in the caries which results from tubercle, where the bone is worm-eaten and loses weight to a marked degree; it is a common sight to see candidates in examination weighing a bone in their hands to decide whether it has suffered from tubercle or syphilis. But it was Grieg's observations which brought to our notice that increased blood supply meant decalcification and softening of the bone. With this in mind the true pathological interpretation of the condition became easy.

The accident occurs in young children at a time when the bones have not reached maturity, when they are still growing, are more vascular than adult bones, and, therefore, when they participate more readily in the increased vascularity which accompanies inflammatory processes in their neighbourhood.

We have seen that though this form of dislocation occurs in association with inflammatory processes in the neighbourhood of the base of the skull, a certain period of time is necessary for the decalcification to take place after the inflammatory process has started. This is shown in nearly all cases where a detailed description of the disease is given. These facts are confirmed by x-ray photographs, which reveal that decalcification has taken place in the anterior part of the ring of the atlas. This might be thought to be congenital if it were not for the excellent photographs published by Mr. Watson Jones, which show the ring of the atlas again fully calcified four months later.

The anterior and lateral part of the ring of the atlas is softened by decalcification, and so the attachment of the transverse ligament becomes insecure, and the odontoid process is no longer held in position. All the other ligaments attaching the odontoid to the atlas vertebrae partake in the softening. When this has happened the scene is set for some slight but sudden movement to cause displacement between the two bones, which now have little to hold them together, and the atlas passes forward upon the odontoid vertebra.

It all depends upon the degree of excursion of the bone as to what occurs. If the excursion is bilateral and extreme the odontoid process will immediately press upon the spinal cord and sudden death will result as in Reid's case, quoted above. If the excursion is unilateral and slight only one side will be subluxated, and the spasm of the muscles will fix the subluxation and make up in some degree for the lack of ligamental restraint.

With the passing away of the inflammatory process recalcification will take place, and it may be that the subluxation will be reduced of itself, but the edges of the articular processes are sharp and well defined, and tend to hitch the one on to the other; this makes spontaneous reduction difficult. Nevertheless, it has occurred quite unexpectedly in several cases, early in one of Fitzsimmons's cases, and after two years in one of mine, where it may have been helped by manipulation of the neck during the curetting of the tuberculous glands.

Clinical History

The histories are mostly similar, and seem to register a very clear picture of the condition. The child has an inflammatory condition of the nasopharynx or upper part of the neck. One to two weeks later stiffness of the neck is complained of, and the head is held in a wry-neck position. In most cases there is no history of violence,

and the matter is treated as part of the inflammatory process, which indeed it is. In one or two cases where there has been a fall it is not quite clear if the condition was due to it, though in some cases violence was adjudged the cause.

The child assumes the ordinary position of wry-neck, and there is a certain amount of rigidity and fixity of all the muscles of the neck, and movements or attempts at movements are resented as painful. At first little is thought of the condition; in few cases is it considered necessary to have an x-ray photograph taken at this time. In those cases, however, where a photograph has been taken several things are noted. There is a distinct subluxation of the atlas upon the odontoid and a marked lessening of the shadow of the anterior part of the atlantoid ring compared with the bones lower down the neck; indeed, this may be so marked that a congenital defect may at first be suspected.

In the commoner unilateral subluxation there is no pressure on the spinal cord, owing to the ample space provided in this region, though this must be encroached upon. Pressure symptoms have been noted to come on almost at once, as in Ogilvy's case, where they appeared on the fourth day and disappeared again on the eleventh; or they may come on late, as in my first case. On examining the pharynx with the finger a distinct irregularity and protrusion of bone can be felt at the level of the soft palate. This is more evident on one than the other.

Treatment

A correct recognition of the factors of the condition will dictate the line of treatment to be advised. Whether control of the neighbouring inflammatory process is the first essential step, or the old rule of reducing a dislocation at the earliest possible moment is the most important, is difficult to decide. In most cases, however, considerable time has elapsed before the diagnosis is made and the case comes to the surgeon, so that the question does not arise, and then replacement at any early date is to be desired. This method was adopted in Mr. Watson Jones's two cases with complete success. The head was fixed in plaster for ten weeks; this was followed by exercises and a return to normal. No surgeon with any imagination, however, will contemplate this form of treatment lightly. The anaesthetic, by relaxing the muscles, removes the last barrier to the free movements between the two bones, and with free movements sudden death is likely to ensue. After reduction the application of a bandage round the neck cannot be altogether free from danger. In most cases it would be necessary, frankly, to explain the risks to the parents. In my two cases the parents at once vetoed any active treatment; although in one the parent had no objection later to a bone-setter wrenching the boy's neck.

One is therefore reduced to fixing the head in the wry-neck position with weight and pulleys to see if reduction will occur as the deformity and disability become less. I have no doubt also that at the tender age of most of these patients the gradual development of the parts will render less and less apparent any deformity which might ensue. Some of the patients have been kept in the recumbent position for months with excellent results.

My own belief is that these cases are more common in a slight degree than is generally supposed, and that many of the temporary wry-necks associated with inflammation of the upper part of the neck are in reality such cases in a mild form, which rectify themselves and leave no trace. It is certainly curious that if one case has been recognized and impressed upon the memory, other obvious ones seem to be encountered shortly afterwards.

BIBLIOGRAPHY

- Reid: Quoted by Grieg.
Swanberg: *Journ. Amer. Med. Assoc.*, 1919, lxxii, 107.
Berkheiser and Seidler: *Ibid.*, 1931, xcvi, 517.
Grisel: *Presse Méd.*, 1930, iv, 50.
Défosses: *Ibid.*, 1930, No. 70, 1179.
Grieg: *Clinical Observations on the Surgical Pathology of Bone*, 1931.
Bell: *The Nervous System of the Human Body*, 1830, App. cxxvii, No. lxiv, 64.
Rocyn Jones: *Proc. Roy. Soc. Med.*, Clinical Section, November 11th, 1932.
Kelly: *Ann. of Surg.*, 1905, xliii, 245.
Ogilvy: *Amer. Journ. Orthop. Surg.*, 1915, xxvii, 314.
Jacobs: *Münch. med. Woch.*, 1908, lv, 1836.
Fitzsimmons: *Interstate Med. Journ.*, 1915, xxii, 983.
Stammers: *Lancet*, 1933, ii, 1293.
Wittek: *Münch. med. Woch.*, 1908, lv, 1836.
Ely: *Ann. of Surg.*, 1911, liv, 20.
Weinlander: *Wien. klin. Woch.*, 1910, No. 50.
Watson Jones: *Proc. Roy. Soc. Med.*, February, 1932.

GUMMA OF THE BRAIN

WITH A REPORT OF A CASE TREATED SURGICALLY

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(With Special Plate)

There is a very prevalent belief that gumma of the brain is rather a common form of intracranial new growth, but this view is not borne out by statistics. Thus Cushing,¹ whose figures cover a period of thirty years and go back well into the pre-Wassermann and pre-salvarsan era, had only twelve cases of gumma among his two thousand patients with verified intracranial neoplasms; Sachs,² again, had but four cases in eight hundred intracranial operations—that is, 0.5 per cent. of the whole. Gumma cerebri is thus to be regarded as decidedly among the rarer types of space-occupying lesions of the intracranial cavity, and it is felt that operations for the condition are of sufficient rarity to justify the publication of the case reported below, while the unusual features of the lesion, and the resultant difficulty in the differential diagnosis, make it one of special interest.

Case Record

A. A., 37 years, a hammerman, was transferred to the Victoria Infirmary from Kilmarnock Infirmary on February 21st, 1934, suffering from headaches, mental deterioration, Jacksonian epilepsy, and gradually increasing right-sided paresis, of eight months' duration.

There was a definite history of syphilitic infection, diagnosis of which was made in 1919; energetic treatment followed, after which his Wassermann reaction, previously positive, had become negative.

In July, 1933, he came home from work complaining of very severe pains in the head. These persisted, and two weeks later he had his first Jacksonian seizure. Further fits followed at varying intervals; occasionally he would have two or three in twenty-four hours, at other times periods of freedom of several days would occur. Gradually it was noticed that he was losing power in his right hand, and later the right leg became involved also. This was his state when he was admitted to Kilmarnock Infirmary on October 13th, under the care of Dr. Hamilton and Dr. Currie, and thereafter, in spite of energetic anti-syphilitic treatment, his condition gradually deteriorated, and by the end of October he was bed-ridden. The fits continued, as did the severe headaches, and latterly these had been associated with periods

A. VICTOR NEALE AND ALLAN G. W. WHITFIELD: RHEUMATISM AND ITS RELATION TO ARTERIAL DISEASE
AND PERIARTERITIS NODOSA

FIG. 5.—Exterior of heart showing nodular thickening of the arteries.

FIG. 6.—Interior of heart showing mitral valvular disease and diffuse disease in the arterial circulation.

DUNCAN C. L. FITZWILLIAMS: INFLAMMATORY DISLOCATION OF THE ATLAS

FIG. 1.—X-ray, front view.

FIG. 2.—X-ray, side view.