is a fluid enclosed in a closed case, any pressure produced at any point is equally transmitted to all points and therefore to the optic nerves in their sheaths. The brain is a viscous fluid and is divided up by prolongations of its membranes forming the falx and tentorium, but as these divisions are not complete and are yielding they do not prevent the transmission of pressure to all parts equally. The transmission of pressure to the optic nerves causes swelling of the discs. Now the swelling of the papilla takes place into the globe of the eye. This brings me to the point of my thesis, and that is: That the degree of swelling depends, not on the irregularity of the intracranial pressure, which I have pointed out should be equal in both nerve sheaths, but upon the intraocular tension being greater in one eye than in the other. We know that the tension is not necessarily the same in both eyes. For instance, acute glaucoma sets in one eye only, and it is common experience to find the tension greater in one eye than the other. This difference is often present, no doubt, in slight degrees, which are not appreciable clinically, and is probably due to slight dissimilarity in the lenses. I believe myopes tend to have a low tension and hypermetropes a high.

I have already shown that the eye is a rigid case, and the optic papilla its weak spot. Now in the normal eye the tension is kept normal and its excess of internal secretions eliminated by filtration through the canal of Schlemm and the spaces of Fontana. What happens if this filtration is obstructed, as in chronic glaucoma, which I believe usually occurs in hypermetropes? Where is the result of this obstruction and increased tension shown? It is shown on the optic papilla, the unsupported point in the eye; for while in the normal eye the papilla in a coronal section is seen slightly depressed, like the depression in a saucer, yet in the eye of chronic glaucoma it forms a

second globe leading out of the first. So that, looking at the fundus with an ophthalmoscope, one sees a deep cup with parts of the vessels completely hidden on account of the globular dilatation that has taken place. For this yielding to take place, the intraocular pressure must be greater than the pressure in the nerve sheath, and therefore greater than the intracranial pressure.

Now what takes place when the converse holds, and the intracranial pressure is raised, with a normal eye? As the papilla begins to swell by reason of the pressure transmitted along the sheaths, the pressure in the eye rises slightly, but is immediately relieved by the normal filtration processes, so that the swelling can go on unchecked. In this case, if both eyes were normal, the swelling would be the same in both eyes. But suppose the filtration processes were hindered in one eye producing *plus* tension, then the swelling of that papilla would undoubtedly be hindered by the greater intraocular pressure, while the swelling on the other side would go on unchecked. Thus slight and quite unappreciable degrees of tension might materially hinder the swelling of the disc (the swelling being measured in dioptries, a very minute measurement).

We have, then, in the optic papilla a weak unprotected spot, which when the excess of pressure is intraocular bulges towards the brain, and when intracranial towards the eye, and we have the brain a fluid which transmits pressure applied at any point to all parts.

I maintain, then, that the papilla is peculiarly subject to changes in pressure and that the pressure exerted on the papilla from the brain side is equal in both papillae, and that therefore inequalities in the papilloedema found on ophthalmoscopic examination depend not on differences of intracranial pressure on the papillae, but on the inhibiting action of increased intraocular tension on the side of the lesser swelling.

OSSIFICATION IN THE BRACHIALIS ANTICUS FOLLOWING INJURY TO THE ELBOW.

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THE following case, being a good example of this somewhat rare condition, seems worth reporting:

On December 26th, 1908, R. M., aged 37, a brewer's drayman, when playing football, fell with his right arm doubled under him. As he could not use the arm he went to the hospital three hours after the accident, when he was seen by the house-surgeon, who made an examination with the *x* rays; he found no fracture or dislocation, but much swelling round the right elbow-joint. A right-angled splint was applied for a fortnight, and during this time, and for the next month, the joint was treated by massage and passive movement.

The man resumed work in six weeks, but within four or five months of the accident he felt a lump in front of the elbow, which gradually increased in size.

On October 11th, 1909 (nine months later), he was moving a barrel of beer weighing 4 cwt., when he felt something give way in the elbow; he again went to the hospital, where I saw him, and found the following condition: He complained of loss of power and of considerable pain in front of the elbow-joint, where a hard mass could be felt in the inner bicipital sulcus and above the level of the bend of the elbow. The relation of the bony points was normal. The skiagram shows the condition present. As the man could not lift any weight or in any way follow his ordinary employment it was decided to remove the mass, which was diagnosed as partial ossification of the brachialis anticus muscle. The operation was troublesome, as the brachial vessels ran in a groove on the anterior surface of

the swelling, and were densely adherent to it; the wound healed by primary union, and now, three months after the operation, there is perfect movement in the joint, and the man can lift heavy weights as before.

The specimen removed was sent to the Clinical Research Association, the report being as follows:

This specimen is composed of hard bone, having the structure of branching masses of considerable thickness, with spaces containing blood vessels, fat, and what appears to be remnants of muscle. At one end the bone is forming in muscle, at the other in dense fibrous tissue. There is no active bone formation going on now.

Thomson and Miles¹ refer to this condition as occasionally following on

backward dislocation of the elbow, and say that "these outgrowths are due to displacement of bone-forming elements either at the time of injury or as a result of forcible attempts at reduction. According to D. M. Greig, they do not develop in the tendon of the brachialis anticus, but under, and are not of the nature of myositis ossificans."

In this case no fracture or dislocation was discernible by the *x* rays three hours after the

original accident, but some bone-forming elements were presumably displaced at the time of the original injury. It is not easy to determine what caused the loss of power at the second accident, as no rupture of muscle or tearing away of its insertion was discernible at the operation.

I have to thank my colleague Dr. W. L. Bell for his kindly help at the operation, and the house-surgeon, Dr. Hendrie, for notes of the case and for the skiagram.

REFEREN

¹ Thomson and Miles, *Manual Surgery*, vol. i, p. 513.