the spinal cord was severed, and the vertebral arteries and all the ligaments were torn across.

The shock to the nervous system produces an immediate loss of consciousness, with complete paralysis of all the voluntary muscles. It takes a body moving under the influence of gravity three-quarters of a second to fall through the space of nine feet; and, owing to the velocity acquired according to the law of uniformly accelerated motion, the time occupied in the last seven inches—during which the stretching and tightening of the rope occurs—is only '0225 of a second. If to this we add, say, '0275 for the elasticity of the rope, then the whole time during which the shock could be felt is only '05, or $\frac{1}{20}$ th of a second. Even from this we must deduct the time which it takes for the nervous impression to travel to the sensorium and back, but, as the nerve current travels at the rate of 100 feet per second, this is so slight that, like the atmospheric resistance to the falling body, it may be left out of account. Although loss of consciousness, and it is with this that humanitarians are chiefly concerned, is instantaneous, yet death, as evidenced by the cessation of the heart's action, does not take place so rapidly. It is possible in some cases that the cardio-inhibitory centre may be stimulated, or the vagi compressed, so as to immediately arrest the beat of the heart, yet I am convinced that this is the exception, and not the rule. The respiratory and vaso-motor centres are at once paralysed. I have never seen even the faintest involuntary gasp, and the arteries feel at once to have lost tone. The excito-motor ganglia of the heart keep up its action, in the majority of cases, for some minutes independently of the central nervous system, and its arrest is probably brought about by a process of asphyxia. The immediate cessation of all respiratory movements deprives the heart of all assistance in carrying on the circulation, and prevents the lungs from becoming surcharged with blood, as in ordinary cases of asphyxia, but the other signs of death from that cause are usually present, such as turgescence of the right side of the heart and general venous system; great lividity of the face, swelling, and perhaps protrusion, of the tongue. It should be remembered that these latter signs are best observed during suspension, because when the body is taken down hypostasis occurs quickly owing to the great fluidity of the blood, the tongue recedes within the mouth, and the general lividity on the upper surface of the body disappears, to reappear in the most dependent parts. The right side of the heart soon becomes incapable of driving the unoxidised blood through the lungs; the left ventricle at first readily propels the blood into the lax arteries, but soon the supply is diminished and the contraction becomes feeble, and at the same time the blood is accumulating in the venous system, and thus tending to equalise the pressure, and so at last the left ventricle is unable to drive its modicum of blood through the systemic capillaries. We have thus at the same time both sides of the heart unable to perform their work, and cessation of the cardiac action is the result. The time during which I have observed the heart's action after dislocation of the cervical vertebræ has ranged from two to thirteen minutes. As Professor Haughton has shown, the destructive effect on the neck of the criminal is in proportion to the *vis viva* which is acquired by the weight of the culprit and length of the drop; and if the drop be long enough, the vertebræ are certain to be dislocated, no matter what be the position of the ring or thickness of the rope. The *vis viva* in any case is equivalent to half the mass multiplied by the square of the terminal velocity. Let *W* represent the weight of the criminal and *S* the length of the drop, then the formula will be:—

$$\frac{1}{2} M V^2 = \frac{1}{G} \frac{W}{2} 2 G S = W S,$$

or the weight of the criminal multiplied by the length of the drop expresses in foot pounds the amount of work expended on the neck of the criminal. I have not complicated the formula with the co-efficient of the elasticity of the rope—which is very slight—as we will devote some attention to the character of the rope further on. I would now modify Dr. Haughton's rules by substituting, say, 1260 foot pounds for 2240. If the neck of the criminal be small and delicate, or the rope very fine, then it would be well to calculate on a lower basis—say, 1120 foot pounds. Thus, a man weighing 140 pounds would require a drop of nine feet ($1260 \div 140 = 9$), and one weighing 120 pounds should have ten feet and a half ($1260 \div 120 = 10\frac{1}{2}$). The rope should not be too thick nor too elastic, otherwise the abrupt shock will be broken, and the

advantages of the long drop lost; but, on the other hand, it should not be too thin nor too inelastic, as then there is not merely the risk of the rope breaking, but also of snapping the head off the culprit. The rope should be of the finest and best hemp, pliable, and capable of bearing a strain of at least a ton and a half. About three-fourths to seven-eighths of an inch in diameter will be found a convenient thickness, and every rope should be tested before being used. I have been told by the master of a ship, that if in the manufacture of the rope the hemp be run through oil, it makes the rope much more pliable. It would certainly prevent it from becoming stiff when exposed during a wet morning. The iron hooks and couplings to which the rope is attached should be inspected on each occasion.

There has been a great difference of opinion regarding the position of the ring; Professor Haughton recommends that it be placed under the chin, while Dr. Barker of Melbourne would have it on the nape of the neck. When the ring is placed in the latter position the chin naturally falls forward on the sternum, and the rope has no leverage action whatever to assist in dislocation; and, moreover, the noose does not tighten well on the neck, but the ring lies against the occiput; so this position is not only the worst for producing luxation, but also for strangulation. When the ring is under the jaw or chin there is a leverage of several inches, the head is thrown back or to one side, and the noose firmly constricts the neck. In the stretching of the rope the noose tightens several inches; if therefore the ring be placed under the angle of the lower jaw on either side, and directed forwards, it will be drawn under the chin in the act of tightening. The noose should be placed as high in the neck as possible, and drawn just sufficiently tight to prevent it slipping out of position while the body is falling.

If those in authority would lay down a few simple rules as to the manner in which executions should be performed, then it would not require much *science* to carry them out. These rules might perhaps also have the effect of relegating the executioner more into obscurity, and dispel all illusionary ideas as to his being the possessor of a *mystic* craft, or one to be fêted by the populace and interviewed by the press in order to satisfy a morbid public taste.

Liverpool.

CASE OF TRIGEMINAL NEURALGIA, WITH EXOPHTHALMOS, AND PARALYSIS OF SEVERAL CRANIAL NERVES.

By H. FRENCH BANHAM, M.A., M.D. CANTAB,
PHYSICIAN TO THE SHEFFIELD GENERAL INFIRMARY.

MARY S—, aged fifty, was admitted into the Sheffield General Infirmary on Jan. 18th, 1884. For six or seven years past she has suffered from occasional attacks of facial neuralgia, which for the last two years have been much more frequent, and, indeed, she has rarely been a whole day free from pain. The pain has generally affected almost the whole of the left side of the face, though at some points it has been specially severe. Some external strabismus seems to have been noticed about October last, and at that time she suffered also from diplopia. The squint has with the progress of time become more pronounced; the diplopia, however, passed off after a couple of months, but has frequently recurred since for a week or two together. Ptosis was first observed early in January; it was, however, partial, and only appeared during the attacks of severe pain, but for the last month it has been constant and complete. She has been troubled with polyuria for some months, having generally to rise three or four times at night. Her memory of late has been very defective. She has had eleven children (of which nine are living and healthy) and one miscarriage. There is no reason for supposing that she has suffered from syphilis.

On admission.—The patient is found to be suffering from severe paroxysms of neuralgia, which occur once or twice in the day, but are not regularly periodic, and each of which lasts from one to three hours. The pain affects the whole of the left side of the face, but at times it seems to concentrate itself with special violence at the supra and infra-orbital regions and over the malar bone. Mr. Coombe, the assistant house-surgeon, who has seen the patient in many of her neuralgic paroxysms, tells me that at such times there is great tenderness over the affected parts. This tenderness entirely subsides during the intervals, but some dull pain in

the head continues, and she complains also of a constant feeling of formication, especially in the skin about the chin. There is ptosis of the left eyelid, dilatation of the left pupil, some amount of external strabismus, and the movements of the eye are exceedingly limited. There is marked protrusion of the left eyeball, which seems scarcely to be overcome by light pressure upon it, but at the same time the pressure causes no pain. There is some deafness of the left ear, which, as far as I can ascertain from an examination by the tuning fork, seems to be of central origin. The patient, however, is unintelligent and inattentive, and I do not feel that my results by this test are conclusive. There is some redness and tenderness of the lining of the external auditory meatus, with a tendency to the formation of a large amount of cerumen, but the tympanum is tolerably healthy, and the meatus was well cleared previous to the examination. The tongue on protrusion deviates very slightly but constantly to the left. There is a suspicion of some amount of paralysis of the right side of the face. Smell and taste are normal. The sight of the left eye is defective, the outline of objects being indistinct; there is, however, no hemianopsia or other contraction of the field of vision. There is slight evidence of commencing optic neuritis at one point in the right eye. The pupils contract only feebly to light.

During the patient's stay in the infirmary no important changes took place in her symptoms. Antisyphilitic remedies among others were tried, but without producing any important result. A careful consideration of the history and symptoms of the case has led me to the opinion that in all probability there is a tumour at the base of the brain, corresponding with the middle fossa of the skull, its influence by meningitis or otherwise extending beyond this limit so as to affect the auditory and hypoglossal nerves.

The chief points to which I desire to call attention in reference to the neuralgic paroxysms are—1st, that three divisions of the fifth nerve are implicated; and 2nd, that although during the paroxysms there is general hyperæsthesia of the surface, and that considerable pain is caused by pressure at certain points over the nerves, yet that these conditions are entirely absent in the intervals between the attacks. These two facts seem to me to point very strongly to the central origin of the disease. The opposite conditions exist in cases associated with peripheral causes. There seems to be tolerably complete paralysis of the motor-oculi nerve; and notwithstanding the fact that the exophthalmos cannot be overcome by light pressure, it may still perhaps result from a paralysed condition of all the ocular muscles. The deafness that exists, although slight, probably depends upon some direct implication of the auditory nerve. It is then tolerably clear that this lesion, whatever it may be, implicates the third, fifth, and ninth nerves; and there is considerable ground for thinking that the portio mollis of the left side and the portio dura of the right side are also involved. The base of the brain is pretty certainly indicated as the locality of the mischief, and there are no symptoms to lead one to suppose that the part of the brain or any of the nerves lying in the anterior fossa are in any way concerned, and the nerves connected with that portion of the brain which lies in the middle fossa of the skull are those whose functions are chiefly disturbed. This may not, however, represent its exact limitation, as we find some evidence even of paralysis of the ninth nerve. The steady, persistent, and progressive character of the symptoms leads one to the opinion that they are due to a tumour (occupying the middle fossa) rather than to a basilar meningitis, although their somewhat irregular extension may arise from the co-existence of this latter condition.

Sheffield.

ON A CASE OF THROMBOSIS.

BY MILNER MOORE, M.D., M.R.C.S.,

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AT a time when a case of thrombosis has been recently brought for discussion before the Clinical Society, it may be interesting to place on record a somewhat similar case, more especially as medical literature is not particularly fruitful in the description of accidents of this sort.

Mr. H—, forty-six years of age, had always been a robust and healthy man, but, owing to an accident during his youth, he had partial ankylosis of the right knee in a semiflexed position. While out walking, about two miles

from home, on Dec. 6th, 1883, he slipped in the snow and fell, breaking the right femur at its lower third. Assistance was soon obtained, and he was kept warm with shawls and wraps, but fully two hours elapsed before he was conveyed home under Dr. Thompson's supervision. My assistance was then sought, and, seeing the difficulty of setting the fracture in the usual way, owing to the ankylosed knee, I applied bandages of plaster-of-Paris, while Dr. Thompson kept up extension until the plaster had set. The limb was then put at rest upon a McIntyre's splint. All appeared to progress satisfactorily until Dec. 23rd, when I received a summons, and found that pneumonia of the right lower and middle lobes had set in. This ran its course without complications, with the exception of rather obstinate constipation, and all appeared to be going on well until January 14th, when pain occurred with some severity on the inner surface of the left thigh, which rapidly became enormously swollen and cedematous. Within three days the right extremity above and below the plaster case became cedematous also, and on both sides, as high as the umbilicus, the skin was boggy, and retained marks of the finger-nails for several minutes. With the aid of hot fomentations and bandages, combined with the administration of purgatives and diuretics, the cedema subsided to a certain extent, and it was considered advisable to remove the plaster-case, when the fracture was found to be fairly united. The case was reapplied for the purpose of support, and the patient was advised to move about with the aid of crutches in the early days of February. Mr. H— then went to Bournemouth, but while there he did not improve, and was so unable to use his legs (the left especially) in walking, that I advised him on his return journey to call and see Dr. Broadbent. This he did; and Dr. Broadbent's opinion is that a clot still exists in the inferior vena cava. Since his return home the patient has much improved under the application of gentle shampooing and rest in the recumbent position, with occasional gentle out-door exercise when the weather permits. The sequence of events—simple fracture of the femur, pneumonia, and thrombosis—renders this a very interesting and instructive case; and what makes it still more interesting, is the fact that the patient is now rapidly recovering.

Coventry.

A Mirror

OF

HOSPITAL PRACTICE, BRITISH AND FOREIGN.

Nulla autem est alia pro certo noscendi via, nisi quamplurimas et morborum et dissectionum historias, tum aliorum tum proprias collectas habere, et inter se comparare.—*MORGAGNI De Sed. et Caus. Morb.*, lib. iv. Proæmium.

ST. THOMAS'S HOSPITAL.

BULLET WOUND OF BRAIN FROM THE LEFT TEMPLE, FOLLOWED BY RIGHT HEMIPLEGIA, OPTIC NEURITIS, AND EPILEPSY; EXPLORATION AND REMOVAL OF FRAGMENTS OF THE BULLET AND DEPRESSED SPICULA OF BONE; RECOVERY.

(Under the care of Mr. SYDNEY JONES.)

FOR the following notes we are indebted to Mr. W. H. Battle, surgical registrar.

J. G—, aged twenty-one, a clerk, was admitted on Dec. 11th, 1882, and left March 8th, 1883. He was re-admitted Dec. 19th, 1883, and left Feb. 2nd, 1884.

On December 10th, 1882, at 2 A.M., the patient was found in an unconscious condition, having shot himself in the forehead. When found blood and brain-substance were escaping from the wound. He had two attacks of convulsions: one at 8 A.M. and another at 2 o'clock the following morning.

When admitted on the 11th he was almost unconscious, breathing rapidly; there was a small bullet wound on the left temple, filled with clot, the integuments around being puffy. The wound was situated two inches and a half above the left brow and an inch external to the middle line. The patient groaned frequently, as if in pain. When told to do so he moved his left leg and arm, but had little command over the right arm and leg, which were, however, moved frequently in a spasmodic manner; the sensation was nearly, if not quite, abolished on the right side, but was good on the left. He could not protrude his tongue. The pupils were