

minutes fatally, destroys life, as a rule, within twenty-four hours. It is this dangerous phenomenon which we must now discuss.

From observation of the condition of patients after all kinds of operations it is evident that the phenomena of dangerous shock differ according to the part of the body operated upon, according to the condition of the patient before the operation, the concurrence of accidental hæmorrhage, etc. The alteration of the intracranial tension which is produced by opening the skull, of itself necessarily causes shock after encephalic operations in a manner which is somewhat different from that caused by other operations. Therefore I think its treatment must also be different. The nervous system is responsible for the maintenance of the respiration, the maintenance and control of the temperature of the body. Hence the only way in which we can adequately examine into the subject is by systematic discussion of these several points.

Fortunately the clinical investigation of the first—the alteration of the intracranial tension—has been rendered more easy by reason of the procedures adopted during the last thirteen years. In 1893, at the discussion in the Section of Surgery of this Association at Newcastle,⁴ I pointed out that the early statistics of intracranial operations showed that the majority of deaths occurred from a severe degree of shock which could be in great part avoided by dividing the operation into two stages, the interval between them being about five days.*

The first stage consisted of the opening of the skull, the second of opening the dura mater and removal of the lesion. On the same occasion I drew attention to the fact that although at the second stage the dura mater was opened, the removal of the tumour was often attended by relatively little shock. Subsequent experience has fully confirmed these statements, and shown that it is in fact the opening of the skull which causes most general depression of nerve energy and most alteration in the circulation.

METHOD OF OPENING THE SKULL.

I cannot spend time on the various mechanical devices for opening the skull, but as much of the shock depends on the way in which this is effected, I must allude to the principles which I believe govern the opening of the cranio-neural tube at any point. Of these the first is that as far as possible the bone should be divided with as little vertically applied force as possible, and removed with the least possible pressure on

* The advantage of systematic two-stage operations only properly applies in my opinion to encephalic cases, although I have used it in emergency in a spinal operation.—Cf. also Brodnitz, *Verhandlungen der deutschen Gesellschaft für Chirurgie*, 1905, p. 219.