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ON THE DIRECT TRANSFUSION OF BLOOD—AN EXPERIMENTAL AND CLINICAL RESEARCH.*

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IN the early period of its evolution surgery was wholly empiric and was for the most part employed in the tragedies of life; this period of heroic surgery which was practised by the daring or the reckless was followed by the anatomic, in which the living functioning being was treated like the cadaver or the manakin. With the rise of pathology, surgical conception embraced new fields and its practice conquered many diseases and infirmities. But the anatomic mechanics of surgery long since have reached their height and it is doubtful whether the mechanical skill and anatomic conception of Potts, the Coopers, Dupuytren, Velpeau or Langenbeck are equalled by a single contemporary surgeon. In the past the empiric surgeon added anatomy, the anatomic added pathology, and now the pathologic surgeon is adding physiology.

The transference of whole or of modified blood by various methods for numerous purposes from an individual of the same or of an alien species, to another, has been practised in many parts of the world for at least four centuries. A critical historical review of this work with reference to the results accomplished may be summarized as follows:

The greater part of it was done before the development of chemistry, physiology, pathology, and bacteriology, *i.e.*, before the period of good hospitals and surgical instruments, and before the establishment of a scientific basis of medicine. There were many accidents arising from infection, clotting, the use of alien blood and from unfortunate selection of cases, so that with the advent of normal saline solution as a substitute for blood, transfusion of blood was no longer practised.

In 1898 this research was begun, using the method of Mosso. It proved impractical and the research lapsed until the work of Payr, Carrel and Guthrie gave us better methods.

The major part of the work was done in the Laboratory of Surgical Physiology, Western Reserve University, and was undertaken in conjunction with Profs. Macleod and Haskins and Drs. Dolley, Hitchings, Cole, Lenhart and Eisenbrey. More than two hundred animals, mainly dogs, were required. The clinical research was in conjunction with Dr. U. E. Lower. This paper consists of abstracts and summaries of the

*The address in Surgery at the Ontario Medical Association, May 27, 28, 29.