

## CRILE'S REVOLUTIONARY THEORIES REGARDING SHOCK

In the *Boston Medical and Surgical Journal* recently there was an exceedingly thoughtful article by Risley regarding recent theories concerning shock. The writer has been specially interested in the exposition of Crile's theory regarding shock and "anoci-association," which Risley has set forth in a most lucid manner.

The essential beauty of Crile's theory is that it has pragmatic value—it is a working theory, which we can use, and apparently with benefit. As Risley points out, while the essential factors in shock are trauma, the anesthetic, a primary rise with a following fall in blood-pressure, decrease in body-temperature and vasomotor inhibition, paralysis and then exhaustion, the great contribution of Crile seems to be in showing that in the presence of shock *there are important changes in the cells of the brain*. These changes may result from such noxious influences as trauma, fear and infection. Bear in mind the deadly influence of fear.

These changes in the brain-cells are radical, influencing the size of the cell itself, involving the cell-plasma, cell-membrane and nucleus. In severe shock the cell may even be reduced to a disorganized mass of protoplasm, showing that, under the terrific morbid nerve-influence the cell may literally become "busted"—to quote Risley's own words.

Crile then goes on to show that these degenerative cell changes are the same, whatever the cause, whether acting over a short period or resulting from disease. But his most interesting observation, perhaps, is that ether, while rendering the patient unconscious, does *not* prevent that deeper somatic agony which ends in brain injury. It is but "a veneer that covers the deeper suffering of the patient (or patient's brain cells)." Ether, therefore, is one of the determining causes of shock. For instance, he proved experimentally that under ether four times as much injury is done to the cells as under nitrous oxide.

These facts furnish the foundation for Crile's methods for the treatment and prevention of shock. This depends upon the ability to block off the brain from the noxious influence, this being accomplished by the conjoint use of local anesthetics and the preliminary use of morphine.

But let us consider first the treatment of shock itself. Crile believes that intravenous infusion is of prime importance because it causes, in the first place, an increase in the venous pressure in the vena cava and consequently the output of the heart is at once increased, the amplitude of the strokes lengthened, the chambers