

repair, but of all repair, it may be observed that it is more perfectly and rapidly executed in proportion to the absence of every symptom which may be fairly called inflammatory.

In some of the lowest animals, as the polypi, repair would appear to be almost unlimited, any portion of the severed animal being able to reproduce the rest; whole limbs are reproduced in the lizard and lobster tribe. But when we ascend to the higher scale of animal life, we find it is only the commoner structures that can be restored. To quote from Sir William Paget, we enumerate:

1st. Those which are formed entirely by nutritive repetition, such as the blood and epithelia.

2nd. Those which are of lowest organization and of lowest chemical character, such as the gelatinous tissues, the cellular and tendinous, and the bones.

3rd. Those which are inserted in other tissues, not as essential to their structure, but as connecting or incorporating them with the other structures of vegetative or animal life, such as nerve fibres and blood vessels. Thus then, we see that the tissues that are capable of being reproduced, are the connective or areolar tissue, including tendons and ligaments, bone and cartilage, blood-vessels and nerves, but not more complicated structures, such as muscle, &c.

The material employed by nature in the process of repair, or reproduction in all tissues, is of course the blood, or rather the liquor sanguinis or fluid part of the blood, but more especially that constituent part of it which has the power of spontaneous coagulation, and which is commonly described as fibrin or coagulable lymph, whose natural tendency is to develop itself into fibrinous or connective tissue, which in certain cases may be further developed into cartilage and bone.

The time within which repair is effected varies as greatly as the nature of the injuries, ages and constitutions of those who are the subjects of them. Vascularity, or formation of new blood-vessels in a new fibrinous exudation, may occur in less than 48 hours, and in the process of granulation a layer of lymph effused one day may appear vascular by the next. Conditions most favorable to repair are early life, the younger the system, the more is it capable of repair; secondly, the state of the blood, which must be so healthy and rich, as to yield readily the necessary materials, in order that the

lymph effused is capable of ready development. Conversely, we find that extreme age interferes in a marked degree with the process of repair, also a poor state of the blood, or this fluid so loaded with ill-assimilated or poisoned material, that effused lymph runs into degeneration, forming pus, which may infect the whole system to such an extent that death even may supervene from pyæmia or septicæmia.

Under ordinary circumstances, that is to say where good apposition has been secured and maintained, where perfect quiet of the parts has been observed, and where the constitution has been kept up, *union* more or less perfect may be reasonably expected in from six to eight weeks, though it may be extended to twelve weeks or more, but after that time the case may fairly be regarded as one of "united fracture" and has to be treated accordingly. As to the cause of failure in these unfavorable instances to produce union, where the previous conditions have been fulfilled, we should have no hesitation in ascribing it to *nature* in nine hundred and ninety-nine cases out of every thousand, rather than to ignorance, want of skill or negligence on the part of the surgeon; and too much care cannot be observed in the witness-box where actions for malpractice impose a most disagreeable duty on a brother practitioner at all times, whose evidence may ruin the prospects of another where no grounds whatever are in existence for any legal remedy against the "freaks of nature." It would thus appear that in the very large proportion of cases of non union of fractures, that the constitution of the patient is impaired to such an extent that the necessary "vis medicatrix" is wanting to complete the process of repair, which is either totally or partially arrested. Too frequent motion and disturbance of parts, are frequent causes which may operate to prevent or lengthen the process of repair in the human subject, whereby the effused lymph thrown out is either converted into bands of fibrous tissue, partially uniting the broken bones, or else a complete false joint is formed provided with synovial membrane and surrounded with a ligamentous capsule.

Non-union is particularly likely to occur when the reparative process may be weakened by deficiency of the vital powers exhausted to any extent by age or debility; also by cachexia induced by gout, syphilis or cancer; also by the recurrence of

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