Clinical implications of the material characteristics, the structure and the three-dimensional arrangement of the connective tissue in the lateral elbow region

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The classical description of the elbow joint implies the presence of an articular capsule, reinforced by ligaments, next to muscles crossing the joint.

In experiments in which the activity of the biceps and brachioradialis muscles in equilibrium with external forces was simulated, it could be shown that the connective tissue in the lateral and medial regions of the elbow joint is not essential in maintaining the integrity of the joint under the conditions of the experiments.

This finding calls for an alternative explanation of the function of the articular connective tissue structures.

Dissection of the lateral cubital region shows that the articular connective tissue forms an integral part of the connective tissue structure belonging to the extensors carpi, extensor digitorum and supinator muscles. This connective tissue forms a multilayered configuration, constituting compartments in which muscular tissue is situated. The muscle fibres are attached to the walls of these compartments. This arrangement could be confirmed in cross-sectional anatomy, including CT and NMR. The concept of so-called articular connective tissue structures being mainly in series and not parallel with contractile elements raises the question as to how tensile stresses are conveyed through this system. Therefore a model has been formulated by means of finite element method which describes the behaviour of membrane-like connective structures. The parameters which serve as input are derived from measurements in two newly designed experimental set-ups to determine stress and strain in connective tissue membranes. It will be possible to estimate the influence of lesions on the mechanical properties of such membranes by means of this method.

It can be supposed that structures functioning in the conveyance of varying tensile stresses play a part in originating proprioceptive information. In that case the arrangement of sensory free and encapsulated nerve endings should be correlated with the architecture of the connective tissue apparatus. This hypothesis could be confirmed.

The meaning of these findings as to diagnosis and therapy of afflications of the region around the lateral humeral epicondyle will be discussed.

Plastic surgery and anatomy (live apart—together?)

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The principles and practice of plastic and reconstructive surgery are by nature so much related to detailed knowledge of anatomy that the question arises whether there is any point in starting a discussion on this relationship.

Plastic surgery is a typical operative specialty in the many facets of that complex we call surgery. The activities are not limited to certain organs or special regions of the body, but are characterised by a way of surgical thinking and treatment. The plastic surgeon deals with problems of tissue defects or tissue disorders.

These defects can be of congenital origin or acquired such as by trauma or infection or after tumour surgery. The goal is always improvement of function, appearance or a combination of both. To achieve these goals some form of tissue transplantation has to be performed. The transplantation can be done as a free tissue graft or with a pedicled flap procedure. The transplants are always of autologous origin.

The main problem with every form of tissue transplantation is the survival of the transplanted part. To achieve the highest possible rate of success detailed knowledge of anatomy, among other things, is a must.

First of all, knowledge of conventional descriptive anatomy is necessary.

Second, the topographical anatomy should be fully appreciated.

Third, the functional anatomy should be familiar to the surgeon.

Last but not least a thorough knowledge of the vascular patterns in various parts of the body plays an important role.

After this short introduction it is obvious that plastic surgery cannot exist without thorough knowledge of anatomy in a broad sense.

How is the situation in anatomical circles?

Anatomists can certainly exist without plastic surgeons. Anatomy is an independent science with enough challenges in the field of research to keep the workers happy forever.

But it is not just by chance that laboratories for anatomical studies are usually incorporated in medical faculties. As such the anatomists take part in the teaching of medical students.

This undergraduate teaching is an intergral part of the basic education of the young students. But being part of a medical faculty has more scope than just undergraduate teaching.

What is the situation with postgraduate teaching?

When a young doctor decides to specialise in a certain part of medicine he will soon discover that he needs more detailed anatomical knowledge, therefore he will go back to his old handbooks of anatomy again and certainly get more out of them than he did at the beginning of his medical studies. But he will need more. This is particularly so for the surgical specialties. Usually the handbooks of the chosen specialty will contain a number of chapters on specific anatomy. The areas of the body which are mostly dealt with in plastic surgery are:

head and neck
upper and lower extremity
genital region
breast
rest of the body, with the exception of the brain and intrathoracic and intra-abdominal organs.

It is obvious that the young trainee in plastic and reconstructive surgery ought to receive a general upgrading of his knowledge of anatomy during his training. In certain fields he will seek more detailed knowledge, for example in the head and neck or in the hand. When he gets in touch with the anatomy laboratory he will find that his questions are interesting enough for the anatomist and will encourage a more clinically directed research