

Chapter 1

What is the Shoulder?

The word shoulder denotes a specific part of the body from the neck to the arm or the region at the base of the arm around the deltoid muscle. Others refer to “shoulder” as a sense of responsibility, or a source of emotion and feeling of human relations. In clinical practice, we often meet young people in their early 20’s who complain of stiffness of the shoulder and even older adults in their 50’s who cannot raise their arms because of a stiff and painful shoulder. Now, where exactly is the shoulder?

In Chinese, the shoulder is the base of the upper extremity, that is, “Kata.” Combining the shape of the shoulder (upper portion of the letter) with the ideogram of the flesh (lower portion of the letter), the Chinese character “Kata” was formed. The upper portion of the Chinese character of “Shoulder” also has the graphic meaning of “Scapula”. The lower portion of the character means flesh, which implies that the scapula is resting on the muscles. The left-side long tail converted to the scapula depicts the humerus. Hence, according to the etymology of the Chinese language, the word “Shoulder” was developed entirely based on the anatomical structure of the region. Therefore, the word shoulder means shape and feelings. However, it appears that the real meaning of shoulder is still not clear (Fig. 1-1). From the shoulder’s functional anatomy aspect, it is the main structure for carrying heavy weights. This functional characteristic of the shoulder serves the meaning of acceptance of key responsibility in both Chinese and English languages. Hence, people with broad and square shoulders would demonstrate the characteristics of being “responsible” or “dependable.”

In English, what does shoulder mean? The shoulder is the part of the body from the neck to the upper arm or the joint connecting the body trunk to the arm. It is further divided into the shoulder joint and shoulder girdle, which separates the joint from the surrounding part.



Figure 1-1.
Ancient Chinese character for the shoulder.

In Japan, the shoulder joint and shoulder girdle denote the same thing. The former means the glenohumeral joint that extends from the arm to the body trunk and the latter means an area of the upper arm or the entire area comprising the clavicle and scapula. Therefore, it is reasonable to consider that the shoulder is a unit composed of the shoulder joint and shoulder girdle. Although the shoulder joint is used in a broad sense to include the shoulder girdle in some textbooks, that use is not applied here.

What is the evolution of the shoulder? How about the shoulders of animals around us? Animals such as dogs, rabbits, and birds running or flying in the forest have shoulders. However, snakes and centipedes crawling in the jungles have none (Fig. 1-2). In 1878, GEGENBAUER established the lateral fin theory, which states that the precursor to the development of shoulders was the fins of fish. If this is the case, then the origin of our present shoulders is the fish, as animals prior to fish did not have shoulders.

Let me describe the configuration and the characteristics of shoulder bones of various animals exhibited in museums



Figure 1-2.
Snakes have no shoulders.

all over the world (Fig. 1-3). The Stegosaurus, those large armored dinosaurs of the upper Jurassic rocks of Colorado and Wyoming, had a ball-and-socket joint in the hip which might have determined headway; however, the shoulder joint was a hinge joint, and it was undeveloped as fore quarters. The Mamenchisaurus discovered in China had a club-shaped scapula. However, the shoulder joint had changed into a ball and socket joint to support its huge body. In the Elemotielium, which lived at waterside, and had a long neck to catch food, the scapula was flat with a configuration close to that of mammals nowadays, for the exquisiteness of function. In the Hadrosaurus, the fore quarters were dwarfed, while those of the Ptopteridae became lightweight like those of a bird. In the Mysticeti, which was excavated from the coal layer of Iwaki, the scapular spine had degenerated and the scapula had become paddle-shaped to reduce resistance in the sea. The scapula of the whale today also has the same configuration. In the Smidoron, which could run at high speed like a lion, the scapula had a specific configuration. The scapular spine divided the scapula into two halves, so that the supraspinatus and infraspinatus muscles could work equally. Primary monkeys had a similar configuration of the scapula, showing increasingly elaborate functions of the fore quarters. In some deer and bears, which can stand up, the scapular spine closely resembles that of humans.

The shoulder of the chimpanzee, which began its living habit standing up, is almost the same as that of the scapula

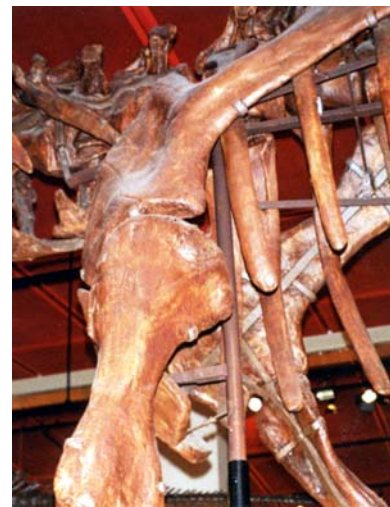


Figure 1-3.
Shoulders of various dinosaurs and animals.

- a: Stegosaurus.
- b: Mamenchisaurus hochuanensis.
- c: Elemotielium (Grand Sloths).
- d: Ptopteridae.
- e: Mysticeti (Iwaki whale).
- f: Black-fish whale.
- g: Smilodon californicus.
- h: Primitive monkey.
- i: Deer.
- j: Bear.



d



h



e



i



f



j



g

4 The Shoulder: Its Function and Clinical Aspects

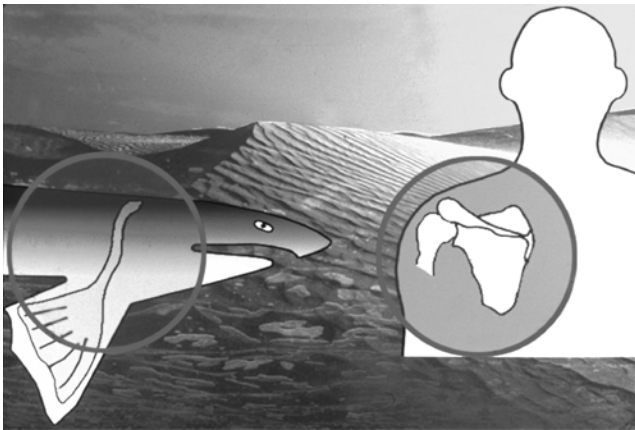


Figure 1-4.

Evolution of the shoulder, from fishes to Homo sapiens.

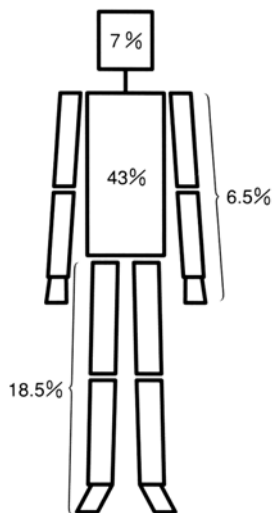


Figure 1-5.

Ratio of the upper extremity to the trunk and lower extremity.

of humans. In humans, the relation between the glenoid and humeral head has changed by 90 degrees, and retroversion of the humeral head has occurred. In this way, our fore quarters have changed the configuration of the shoulder over an astronomical number of years (Fig. 1-4).

The human shoulder is one of the structures that showed marked morphological changes compared with that of closely related animals before the beginning of the standing life of human beings. When we see a precision machine, we are frequently surprised at its mechanism in many cases. However, the preciseness and rhythm of the motion of the shoulder is far more complex than any available precision machine, thus deserving our great admiration. According to



Figure 1-6.

Statue of Gushojin (the King of Hell), an Indian god.

BRAUNE, the arms account for only 13% of the body, that is, only one-third of the proportion of the body that the legs account for (37%). The arm is several times more mobile than the legs (Fig. 1-5).

According to a Japanese historical book *Nihonshoki*, it is said that Saha-deva, a god that dwells in bilateral shoulders, was a figurative god at the Genesis. In Buddhism, it is thought that a god lives in the left shoulder and a goddess in the right shoulder; both are figurative gods belonging to heaven, who record good and bad deeds of human being, and reporting them to the King of Hell after death. They are not well loved because of their talebearing and friendship with the jailers of hell (Fig. 1-6). Has this trend in the metaphysical field affected the practice of medicine in Japan? Although the studies of the brain and visceral organs have been spectacular, not much attention has been paid to the shoulder.

There are two fundamental prerequisites that should be fulfilled by persons who want to study the shoulder. One is to understand its anatomy fully and the other is to observe its functional motion in order to have a better understanding of what it is.

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