

SPUR-LIKE FORMATIONS OF BONE FOLLOWING AMPUTATION.

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THE X-ray picture of a healthy amputation stump should show the bone rounded off and clean, surrounded by a fairly uniform shadow of the soft parts. Some atrophy of the end of the bone may have occurred, or some small amount of periosteal thickening be present. Not a little to my surprise, in the routine X-ray examination of amputation stumps following upon war wounds, instead of this moderate button-like extremity to the shaft there has been seen, in the majority of cases, a shadow projecting from one or other (usually the internal or posterior) border of the bone shaft near its extremity. In one case this represents but a small spicule; in another, a large thick spur; in a third, the the impression given has been of the presence of a "wing" of bone. As a rule these project in an upward direction. They are frequently the source of considerable pain and discomfort, and are responsible for the persistence of a discharging sinus. Their presence, consequently, often necessitates a reamputation. Occasionally they recur following this operation. I have attempted to determine in what proportion of amputation cases these spurs are found, and also their relative frequency in the different bones involved, but at present it is impossible to arrive at any accurate conclusions. This must therefore be left till a later date.

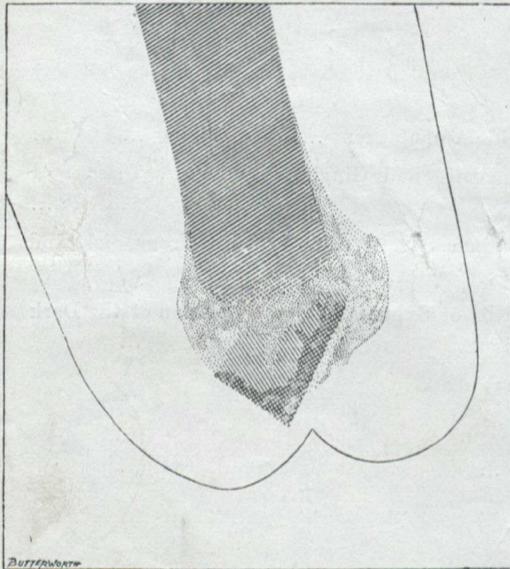


FIG. 1.

Necrosis of end of stump of humerus with the formation of a bone slough.

That these spur-like formations do, on occasions, occur on amputation stumps has been known for a long time. This can, of course, be gathered from what has appeared, from time to time, in the surgical literature. It is astonishing, however, how little is to be found bearing directly on this subject. Many text-books do not mention it, while a few refer to it only in the vaguest manner. For example, no direct reference to "spurs" can be found in the text-books of such authorities as the following: Treves and Hutchinson[1], Rose and Carless[2], Spencer and Gask[3], Waring[4], Cheyne and Burghard[5], or Warren[6]. They refer merely to a possible mushroom-like formation at the end of the bone, or to the occurrence of necrosis (fig. 1), and ascribe these results to the presence in greater or less degree of one, or both, of two conditions, namely, sepsis, and injury of the periosteum about the end of the bone-stump. On the other hand, Binnie[7] gives as one of the causes militating against the efficient weight-bearing capacity of a stump, "irregularity of the end of the bone, either from faulty division of the bone or from irregular callus formation." Farabeuf[8] remarks that it is not unusual to find some irregularity around the end of the bone-stump which may give it a resemblance to a much used walking-stick. These irregularities are periosteal in origin. The deep scar-tissue may become adherent to them, and occasionally also the skin. Under the influence of continued

irritation to the periosteum (e.g., sepsis) there may result not merely a simple roughening, but a variable number of bony spurs, some of them pointed, and of sufficient length even to perforate the soft parts of the stump and the skin. Kocher[9], referring to the cause of pain in stumps, says: "Tenderness is due much more to excessive growth of the periosteum (perhaps, also, of the marrow, Bunge), which leads ultimately to the formation of exostoses."

This dearth of pre-war literature, and apparent lack of experience of this condition on the part of many surgeons, might, at first, appear somewhat astonishing, considering the frequency with which we see cases of this nature at the present time. In the course of one year's work at the Granville Canadian Special Hospital at Ramsgate and No. 15 Canadian General Hospital at Taplow I have come across some 250 examples. On more mature consideration it becomes evident that it is only the changed conditions occasioned by the War that have brought the subject of "spur-formation" so forcibly before us.

In this regard the following points must be considered:—

(1) We have never before had such a series of amputation stumps for observation. (2) Never before have stumps been so systematically X-rayed as during the present War. (3) Owing to the tremendous demand for medical officers occasioned by the War, many amputations have had to be done by men who have lacked experience. (4) The almost universally septic condition of the wounds. (5) The long distances which many of the patients have to travel after operation before arriving at a base hospital, during which journey great difficulties are experienced in the renewal of the dressings, even if, indeed, it is possible to do this at all. On account of these last four points it is hardly fair to compare pre-war amputations with those done as the result of war wounds.

Most observers, e.g., Binnie[14], Hirsch and Bunge[12], Maclaure[11], Kocher[9], and Farabeuf[8] consider that these spurs are the result of bone formation caused by irritation of the periosteum, particularly by long-continued sepsis.

Kocher[9] attributes undue tenderness in a stump, in most cases, to excessive growth of bone from the periosteum. Farabeuf[8] says that spurs may attain such size as to perforate the soft tissues and skin. One need only look through a series of X-ray pictures of amputation stumps to appreciate these statements. (See figs. 2 to 7.) The figures, with one exception, are from cases of amputation through the femur, and have been selected as characteristic of the different forms.

Looking through a series of skiagrams of amputation stumps, it is remarkable how much more frequently these spurs develop on the inner side of the bone than elsewhere. While this applies to almost any bone, it is particularly noticeable in the case of the femur. Referring to amputation through this bone, Hofstätter[13] suggests as an explanation the presence of the *linea aspera*, from which the periosteum cannot be so thoroughly removed as from the smooth surface of the rest of the bone-shaft. The presence of these spurs is one of the principal causes necessitating the reamputation of a stump. These operations have been very frequent during the past three years.

It is obviously a matter of great practical importance, therefore, to prevent the formation of these spurs in the first place. Can this be done?

Bier[10], by his osteoplastic-flap method, first attempted to produce a weight-bearing stump free from spurs. The difficulties in the technique of this operation resulted in the introduction of a modified form, viz., the sub-periosteal method advocated by Cheyne and Burghard[5], Rose and Carless[2], Waring[3], Poncet[15], Monod and Vauverts[16], Laurent[17], and others.

In Treves and Hutchinson's "Manual of Operative Surgery" we read: "The value of the periosteal flap has not yet been clearly demonstrated in all cases . . ." Again, Hirsch and Bunge[12] have shown that the removal of the periosteum (and, according to Bunge, of the marrow) from the last few centimetres of the end of the bone tends to the production of a good, clean stump. Views such as these culminated in the aperiosteal method of amputation. Warren[6], Jacobson[18], Hofstätter[13], and Bunge[19], among others, have stated their preference for this method. Steiger's observations show that satisfactory results can be obtained by any