been made into the softened part of the gland. In this way the whole of the broken-down material can be got away without the necessity of making an actual *incision* or of resorting to scraping. The method of inducing hyperaemia should be so conducted as to give the patient no pain whatever: it must not be carried out with excessive energy.

By means of the Röntgen or X-rays (see X-Ray Treatment) the surgeon is able to procure a distinct shadow-portrait of deeply-placed bones, so that he can be assured as to the presence or absence of fracture or dislocation, or of outgrowth of bone, or of bone-containing tumours. By this means also he is able to locate with absolute precision the situation of a foreign body in the tissues—of a coin in the windpipe or gullet, of a broken piece of a needle in the hand, of a splinter of glass in the foot, or of a bullet deeply embedded in soft tissues or bone. This effect may be obtained upon a fluorescent screen or printed in a permanent form upon glass or paper. The shadow is cast by a 10- or 12-in. spark from a Crookes vacuum tube. The τays of Röntgen find their way through dead and living tissues which are far beyond the reach of the rays of ordinary light, and they are thus able even to reveal changes in the deeply placed hip-joint which have been produced by tuberculous disease. In examining an injured limb it is not necessary to take off wooden splints or bandages except in cases where the latter have been treated with plaster of paris, lime-salts obstructing the rays and throwing a shadow. Thus the rays may pass through an ordinary uric acid calculus in the kidney or bladder; but if it contains salts of lime, as does thc mulberry calculus (oxalate of lime), a definite shadow is cast upon the screen. The value of the X-rays is not limited to the elucidation of obscure problems such as those just indi­cated: they are also of therapeutic value; for example, in the treatment of certain forms of skin disease, as well as of cancer.

Too much, however, must not be expected from them. For the treatment of a patch of tuberculous ulceration (lupus), or for a superficial cancerous sore (epithelioma), they may be of service, but in the treatment of a deeply-seated malignant growth—as a cancer of the breast—they have not proved of value. Moreover, the X-rays sometimes cause serious burns of the skin; and although this happens less often now than was pre­viously the case, still the frequent application of the rays is apt to be followed by cutaneous warty growths which are apt in turn to develop into cancer. In many cases in which the X-rays are used a more prompt and efficient means of treatment would probably be by excision. One great advantage which operative treatment by the knife must always have over the treatment by X-rays is that the secondary implication of the lymphatic glands can be dealt with at the same time. And this, in many cases, is a matter of almost equal importance to that of removal of the cancer itself.

The employment of radium in surgery is still in its infancy. Doubtless radium is a very powerful agent, but even if it were found of peculiar value in treatment its cost would, for the present, put it out of the reach of most practitioners. Probably it will be found useful in the treatment of naevus, rodent ulcers and superficial malignant growths. As to what influence radium may have in the treatment of deeply-seated cancers it is as yet impossible even to guess. For those sad cases, however, which the practical surgeon is reluctantly compelled to admit as being beyond the reach of his operative skill, the influence of radium should be tried with determination and thoroughness. The therapeutic influence of radium may eventually be found to be great, or it may be disappointing. The fact that under direct royal patronage an institution has been established in London for the investigation of the physical and therapeutic value of this newly discovered agent should satisfy every one that its properties will be duly inquired into and made known without mystery or charlatanism and absolutely in the interest of the people. But in the mean­while too much must not be expected from it as a surgical agent. (E. O.\*)

**SURGICAL INSTRUMENTS AND APPLIANCES.** The pur­pose of this article is to give an account of the more important surgical instruments that are now in general use, and to show by what modifications, and from what discoveries in science, the present methods of an operation have come to be what they are. The good surgeon is careful to use the right sort and pattern of instrument, and the chief fact about the surgery of the present day, that it is aseptic or antiseptic, is recorded in the make of surgical instruments and in all the installation of an operating- theatre. Take, for instance, a scalpel and a saw that are figured in Ambroise Paré’s (1510-1590) surgical writings. The scalpel folds into a handle like an ordinary pocket-knife, which alone was enough in those days to keep it from being aseptic. The handle is most elegantly adorned with a little winged female figure, but it does not commend itself as likely to be surgically clean. The saw, after the same fashion, has a richly chased metal frame, and, at the end of the handle, a lion’s head in bold relief, with a ring through its mouth to hang it up by. It may be admirable art, but it would harbour all sorts of germs. If one contrasts with these artistic weapons the instruments of 1850, one finds no such adornment, and for general finish Savigny’s instruments would be hard to beat; but the wooden or ivory handles, cut with finely scored lines like the cross-hatching of an engraving, are not more likely to be aseptic than the handles of Paré’s instruments. At the present time,, instead of such handles as these, with blades riveted into them, scalpels are forged out of one piece of steel, their handles are nickel-plated and perfectly smooth, that they may afford no crevices, and may be boiled and immersed in carbolic lotion without tarnishing or rusting; the scalpel has become just a single, smooth, plain piece of metal, having this one purpose that it shall make an aseptic wound. In the same way the saw is made in one piece, if this be possible; anyhow, it must be, so far as possible, a simple, smooth, unrusting metal instrument, that can be boiled and laid in lotion; it is a foreign body that must be introduced into tissues susceptible of infection, and it must not carry infection with it.

Or we may take, at different periods of surgery, the various kinds of ligature for the arrest of bleeding from a divided blood­vessel. In Paré’s time (he was the first to use the ligature in amputation, but the existence of some sort of ligature is as