Since that paper was written in 1862, I have treated all cases of retroflexion of the uterus on the principles just mentioned and by the means which I have described, and the result has been in almost every case a radical cure. As an example, I will give some particulars of the last case of the kind that was under my care.

A lady, twenty-four years of age, married four years, the mother of one child, born twelve months after marriage, began to complain two years ago of pain in the back and in the hypogastrium, with a sensation of bearing down. These symptoms gradually increased in severity until at last she was scarcely able to walk, and defæcation was performed with great difficulty. On examination *per vaginam*, I found a complete retroflexion of the uterus with a very acute angle between the body and the cervix. The curve was so sharp that I was obliged to bend the uterine sound much beyond the usual curve before I could make it enter the body of the organ. By turning the sound the uterus was straightened, and the prominent tumour behind was completely removed. On withdrawing the sound, the fundus immediately came down, and the distortion was resumed. I told the lady the nature of her case, and that it would be necessary to introduce some instruments which she would wear for some time. Accordingly, on the 12th of last May, I proceeded to pass the stem pessary, but I found great difficulty in doing so, for the uterus was so confirmed in its bent condition that, the instant the sound was removed, and before the stem could be made to enter, the fundus flew back to its unnatural position. I succeeded at last by passing the stem alongside the sound while it remained in the uterus, and I then withdrew the sound, leaving the stem, which kept the uterus quite straight. The flat boxwood pessary was then inserted, and the lady was directed to remain in bed that day.

On coming the next day to see her, I found her so free from any inconvenience that she was unconscious of the presence of the instruments, and asked when I was going to introduce them. The instruments were perfectly in their place, and she was allowed to get up and go into the drawing-room, but not to go out. On the third day I again examined and found everything in its place, and she said she felt better than she had done for many months. The menstrual period was expected in ten days, and I cautioned her that she would probably find it more profuse than usual. This was the case; and it lasted a week and then went off. She used the syringe daily with a weak solution of sulphate of zinc and alum, and went out walking and driving with perfect freedom. On the first of July, the instruments having been then seven weeks *in situ*, I removed them, and found the uterus quite straight. I then passed the plain ring into the vagina, and she left town for the country the following day, and I have not heard of her since.

Subsequently to the publication of my proposal to treat retroflexion after this manner, Dr. Graily Hewitt, in his admirable work on the *Diseases of Women*, suggested a somewhat similar proceeding, using a stem of ivory, and supporting it with a ball of India-rubber, inflated after being passed into the vagina. This, no doubt, is a very good means, but I do not think it as simple as that which I have described; for Dr. Graily Hewitt says, "It is not advisable for the instrument to be worn longer than two or three days at a time, and after each removal the vaginal douche should be freely used." Now, this entails an amount of trouble and attention to the case which is not required in my plan, for, when once the proper sized flat pessary has been introduced, no further attention to the case is required until the time comes for taking all out, and then, the ring being placed *in situ*, the patient may go where she likes for six or eight weeks or longer.

INJURY TO THE AXILLARY ARTERY, CAUSING GANGRENE OF THE UPPER EXTREMITY.*

By WILLIAM R. E. SMART, M.D., C.B., Inspector-General R.N.

INJURY of the axillary artery by forcible extension, without puncture or laceration of the integuments, is not a common accident. Three cases of it in gunnery practice have come to my knowledge; and, as their record may prove useful, I present them at this large professional assembly at one of the chief naval and military stations. They all occurred from explosions in the act of ramming home, by which the rammer was expelled, driving backwards the arm employed in loading.

CASE I.—J. F., aged 23, was injured in a battery before Sebastopol on April 9th, 1855. The thumb and forefinger of the left hand were

lacerated; the acromial end of the clavicle was luxated, its ligaments being torn; and the parts about the shoulder very soon became tumid. I first saw him on the 10th, within thirty hours of the accident. The thumb was in a state of sphacelus; the hand gangrenous. The forearm was insensible halfway to the elbow, but retained warmth downwards to that point; while emphysematous crackling was traceable up to the joint. The shoulder and parts to the mesial line above and below the clavicle were much swollen, with lividity along the anterior border of the axilla. No pulse could be discerned in the brachial or radial arteries. The outer end of the clavicle was raised up, but could be easily replaced by pushing it backwards, when it seemed to float up again at once. A tremor of uncertain pulsation was detected in the tumour; but the transmitted sounds were those of the first stage of pneumonia or a large crepitation, and not of a blood-current. Respirations 40; pulse 108; skin warm; tongue not foul; no sleep.

Third day.—Gangrene was extending up the inner side of the forearm; its veins were turgid. There was a large bulla above the wrist. Towards evening, there were anxiety of face and hard pulse. A whirling sound was thought to be detected deeply in the tumour. The sputa were bloody in dotted points, and non-vascular. Respirations 48, laboured; pulse 108, compressible.

Fourth day.—He was delirious in the night, but calm again in the morning. Emphysema extended to the inner side of the arm.

Fifth day.—The gangrene was not extending; there was no mark of its limit. He had increased cough and pneumonic signs.

Sixth day.—There were appearances of demarcation above the wrist. There was less anxiety. Pulse 98. He had evening exacerbation of fever and fits of cough, with blood-clots in tenacious sputa.

Seventh day.—Vesication and a sphacelated spot appeared above the inner condyle. Respirations 43; pulse 104; tongue dry at point.

Ninth day.—The forearm was in a state of complete sphacelation, and on that account it was taken away at the elbow. A small vessel required ligature at the posterior part. No pain was felt. Incisions were made into the emphysematous parts above the elbow. During the last few days, the axillary tumour had decreased somewhat, through decline of the superficial swelling.

Tenth day.—Pus appeared on the cut surfaces.

Eleventh day.—There were vesications in the axilla. Incisions made into it bled freely.

Twelfth day.—He was hectic and drowsy. A livid blush extended over the front of the chest. Deep incisions at the anterior border of the axilla gave exit to serous fluid mixed with pus and broken coagula, not of offensive odour. The swelling of the parts and the pain were diminished by this.

Thirteenth day.—There was some blood, but little pus, in the dressings. The gangrene was not extending. He had a hectic flush. Pulse very rapid; respirations hurried.

Fourteenth day.—There were vesications at the back of the shoulder, slight suppuration of the incisions, and granulations in the axilla. In the evening, the secretions were checked.

Fifteenth day.—Gangrene was extending. The shoulder and side of the chest were emphysematous. The pain suddenly ceased, and he died at 11 A.M.

Necropsy, six hours after death.—There was rapid decomposition of the corpse. Blood was extravasated in the adipose tissue and muscles of the pectoral region. The ribs and clavicle were sound. The acromial ligaments were ruptured. The shoulder-joint was unaffected. A large cavity of the size of a clenched fist, filled with broken-up coagulum, extended from the axilla inwards under the pectoral muscles and the clavicle; its walls were jagged and sloughy. The artery was pervious to an inch and a half below the clavicle; it was of small calibre, and filled with a well formed black clot. The vein was pervious for two inches, and then was contracted to a point; its walls were softened, and its lining coat blood-stained. Both vessels were lost in the sloughy mass that formed the posterior wall of the cavity. The brachial artery lay flattened and uncontracted, and its inner coat was blood-stained. The brachial vessels and nerves were matted together by infiltrated areolar tissue. There was no pleural effusion. The left lung was adherent at the upper lobe, which was condensed and heavy, and contained air with localised or lobular extravasations of blood, and a few gritty particles like obsolete tubercles. The lower lobe was natural.

REMARKS.—It was evident from the beginning that the axillary artery had been injured. When the patient came under my charge, gangrene had begun, and there was so much infiltration at the base of the neck as to annul the proposal to tie the subclavian at its inner third, amputate at the shoulder-joint, and clear out the cavity. The alternative was to

* Read before the Surgical Section at the Annual Meeting of the British Medical Association in Plymouth, August 1871.

wait events; and the hope was entertained of a line of demarcation being formed through the force of the collateral circulation in the upper arm, which would give the sign for amputating with some chance of success. The vitality that set up suppurative action in the incisions in the upper arm, the apparent check to the extension of gangrene, the complete occlusion of the axillary artery, and the conversion of an aneurismal sac so near the centre of the circulation into the condition of an extravascular effusion ending in an abscess, and, finally, the sudden failure of vitality and the rapid extension of what may be termed hospital gangrene, in contradistinction to the precursory gangrene through want of arterial blood, are features of the case that came out in strong relief. The course of events and the necropsy impressed me that in these accidents the traumatic condition of the artery is similar to that produced when the limb is torn off by machinery without hæmorrhage, a vessel like the axillary not requiring ligature in such case. The inner coat is the first to yield; it is rippled up, and the torn subserous filaments serve to entangle fibrine, that fills up and occludes the artery, after which primary hæmorrhage is not likely to occur. The cavity containing the extravasated blood being then converted into an abscess, as in this case, or the serous portion being absorbed, and its fibrine and corpuscles degenerating into mere connective tissue, there would be a spontaneous cure, as far as the injury to the vessel is concerned. The sudden cutting off the supply of blood without precursory adaptation of the collateral circulation, however, tends at once to loss of vitality of the limb; and, if there be laceration of the extreme points, sphacelus sets in with rapidity, as in this instance. When this case fell under my care, I knew nothing of this form of injury; but its result taught me that it would be the duty of a surgeon not to wait for line of demarcation to form, but to amputate near to the trunk as soon as any sign of gangrene presents; and I inculcated these ideas to others. Since then, two cases have become known to me, which recovered after amputation, without interference at the seat of injury to the axillary artery.

CASE II.—At Corfu, on our Queen's birthday, in 1856, an Austrian schooner of war, in firing a royal salute, had two men blown overboard in loading a cannon. I saw these men as soon as they were picked up and laid on the deck; one had lost both hands, and the other was whole, but greatly "shocked." His surgeon thought little of his case, as one simply requiring a stimulant. Warned by the case related I felt for the pulse, and found it absent; then, on examining the shoulder, I felt an increasing soft tremor, and diagnosed the case. Both men were sent ashore; and, after gangrene had extended to the forearm, amputation was performed about the ninth day, in the upper arm, by Surgeon Webb, of the Military hospital, the aneurismal tumour being treated by ice-bags. When the stump had healed, the patient was sent home.

CASE III.—The next case was made known to me, at the time of its occurrence, by an officer who was familiar with my advice, "to amputate early and leave the axillary artery untouched," as he knew I would gladly receive confirmation of it.

In the year 1868, a seaman was "blown overboard," from an Italian frigate at Spithead. He was sent to Haslar Hospital, where gangrene of the hand supervened; there were absence of radial pulse, early loss of heat and sensation, with great extravasation. The limb was amputated in the upper arm forty-eight hours after the accident, by Deputy Inspector-General Mason. There was no bleeding, and only one small twig required a ligature. The patient recovered without any interference with the vessel at the seat of rupture.

I consider this last case to have been like the first, in its most essential features; and I think that, had I been equally prompt to amputate, the unfortunate man's life might have been spared. I am not prepared to say to what extent, if any, the hand was injured in this last case, but in the second case there was no injury of it.

I am inclined to believe that, where the hand is blown away, the chances of injury at the shoulder are much less; and the only reason I can offer for this is that, when the explosive force is great enough to carry away the parts next to the muzzle of the gun, the leverage is at once destroyed, by which the whole arm would be thrown back with the disruptive force necessary to stretch and lacerate the soft parts which connect it to the trunk. In my early career I knew several cases in which a hand had been blown off in loading a gun, in which primary amputations were performed; but I never heard of suspicion of injury to the axillary artery in such cases. The same reasons will apply when both hands are lost, as in the gunmate No. 2, who lost them without system-shock to prevent amputation of both within three hours of the accident. In case No. 1 the injury to the hand was simply so much as can be caused by a rope or a rammer-staff running rapidly in contact with soft parts, but the arm was thrown back with immense force, as the force of the explosion was not expended on the hand.

LOOSE CARTILAGES IN THE KNEE-JOINT AND THEIR REMOVAL BY SUBCUTANEOUS INCISION.*

By WILLIAM J. SQUARE, F.R.C.S.,

Surgeon to the South Devon and East Cornwall Hospital, Plymouth.

ABOUT ten years ago, I published nine cases of loose cartilage of the knee-joint, and their cure by the operation of subcutaneous incision. Since that time, my experience has been enriched by the addition of fifteen like cases, treated in the same manner. All these twenty-four cases have been operated upon without selection, just as they presented themselves; all have been cured without drawback or accident.

The present occasion appears to be a most fitting one to set forth and advocate the safety and claims of this operation. By reference to our current surgical literature, I find that the old operation of direct incision still has its advocates; and that its results are now, as heretofore, uncertain and dangerous.

My attention was first directed to the consideration of the subcutaneous operation from witnessing the bad results of two operations for the removal of loose cartilages from the knee-joint. One man, now alive in this town, submitted to amputation of the thigh to save his life; the other, a woman, less fortunate, died. In 1860, Sir William Ferguson removed a loose cartilage from the knee-joint by valvular incision. The patient was attacked with severe synovitis, ran great danger of his life, and recovered with a stiff joint. About five years ago, the nephew of a distinguished physician of this county consulted Mr. Whipple for stiffness of his knee-joint, the result of the removal of a loose cartilage by the direct method, by a deservedly eminent metropolitan surgeon. Mr. Whipple asked my opinion on the case. The patient told us that his life was in great jeopardy for many days after the operation, in consequence of inflammation, with fever and delirium. I could multiply examples, but these will suffice.

In his address delivered before the British Medical Association in 1865, Mr. Syme says: "The cartilaginous bodies which are so troublesome in the knee-joint, were formerly regarded as an unsatisfactory subject of treatment, on account of the inflammation which was apt to attend their excision; but the subcutaneous operation suggested by myself in 1841, and afterwards improved by Mr. Square of Plymouth, has afforded a means of remedy both safe and easy."

The operation which I perform was worked out by myself, as I could never find any account of the method recommended by M. Goyrand or Mr. Syme. It is as follows.

I first endeavour to conduct the loose cartilage to the inner and lower part of the joint, just above the articular edge of the tibia; it is then entrusted to an assistant, who firmly fixes it in that position. A strong tenotomy knife, at least two inches long, is thrust through the skin at such a distance from the cartilage that it can be readily cut upon. The capsule of the joint is freely and decidedly incised upon the cartilage through its whole length. The knife, being disengaged from the cartilage, is directed so as to open up the cellular tissue over a convenient part of the fascia of the limb. The cartilage is now pressed and lifted out of the joint into the cellular bed prepared for it, and slid along the cellular tissue for about three inches. It is fixed *in situ* with a firm pad and adhesive plaster; the foot and leg are bandaged up to the edge of the displaced cartilage, the limb attached to a straight splint, and placed at about an angle of forty-five degrees. If no inflammatory symptoms ensue, the cartilage is excised about seven days after the operation.

CASE I.—James Ellis, aged 33, farm servant, was admitted into the South Devon and East Cornwall Hospital on December 3rd, 1856. He had been lame eighteen years, and distressingly so during the last twelve months. Two movable bodies were easily felt in the right knee-joint; they had been there fourteen years. They glided from one part of the joint to another with extreme mobility, and caused great pain and sudden lameness. The joint was often distended with synovia. He stated that these cartilages had distinctly increased in size.

Operation, December 8th.—I fixed the cartilages firmly at the lower and outer part of the joint, and entrusted them to an assistant. Two subcutaneous separations of the cellular tissue were then made with a tenotomy knife two inches in length, at two separate punctures. From the lowest puncture, the knife was directed upon the largest cartilage, and the synovial membrane freely incised upon it. The cartilages, being slid into the bed prepared for their reception, were fixed at its extremity with a pad of lint, adhesive plaster, and bandage. A straight

* Read before the Surgical Section at the Annual Meeting of the British Medical Association in Plymouth, August 1871.