incarning, and cicatrising of wounds, or directs how to fill the wound up with good and sound flesh and keep it to a fair and even level with the adjacent skin, he but proclaims his own ignorance of the properties of the living body.' What we have to do, is to 'save the patient from immediate bleeding, and to lay the wounded parts so cleanly, so neatly, and so evenly in contact with each other, that they may adhere. The rest we leave to nature.'

Sir Charles Bell,[1] although imbued with his brother's teaching, recommends the valvular method in removing loose cartilages from the joints, and states that where the cartilage has escaped into the joint during the operation, the consequences are generally disastrous, on account of the exposure of the joint.

Such is a short abstract of the views held by the greatest surgeons of our country as to the effects of air on wounds; but whatever conclusions were come to, the good results of Abernethy's valvular method were so evident that it was generally recommended. As we have seen, Richter and Theden, and, I may also say, Arnemann,[2] adopted and advised it; and Samuel Cooper[3] (1807) says of it: 'I must consider it in the present state of surgery as the only one warrantable.' Cooper also recommends a valvular incision for the removal of loose cartilages. He does not think that the situation of the incision, a point on which great stress was laid by some at that time, is of any consequence, but he makes it in a valvular manner, brings the edges of the wound accurately together, and keeps the limb extended, and completely motionless. He considers that the dangers of such operations have been much exaggerated, 'but, making every allowance for the influence of prejudice, a man must be very sceptical indeed who does not consider the wound of a large joint like that of the knee attended with real cause for the apprehension of danger.'

In 1808 John Pearson[4] wrote against Abernethy's method of opening psoas abscesses, and in favour of allowing them to burst. He says: 'The instances of those who perfectly recover from the empyema psoadicum are few in number when compared with those to whom it proves fatal.' That his results were not so good as those obtained by Abernethy's method is evident from his description of the course of psoas abscess. He says: 'Whether the abscess be opened artificially, or be permitted to open by a spontaneous rupture, a very large quantity of purulent matter, of the density of good pus, but often inclining to a cineritious colour, is generally evacuated from its cavity. The daily discharge of pus also greatly exceeds the quantity that might be expected from a tumour of that apparent magnitude. The sore frequently puts on a scrofulous aspect, all the hectical symptoms increase, and the patient is gradually destroyed.'

[1] *Principles of Surgery*, edited by Sir Charles Bell, 1826.
[2] *System der Chirurgie*, 1798.
[3] *Treatise on the Diseases of Joints*, 1807.
[4] *Principles of Surgery*, 1808.

Leveille[1] (1812) advocated the direct incision for removal of loose cartilages.

In America Wm. Gibson[2] (1824) advised valvular incisions in operations for removing loose cartilages from joints. He recognised, however, that 'wounds of the larger joints are among the most dangerous accidents in surgery;' and the same may be said of those 'wounds of the smaller articulations, trivial in the eyes of the surgeon, but, in defiance of all calculations, sometimes followed by tremendous symptoms, and even death.'

Sir Astley Cooper[3] (1819 and 1827) does not seem to have expressed any definite opinion on the effects of air on wounds. His method of dressing consisted in applying a piece of lint dipped in blood along the line of incision. This was fixed by strapping. A cooling lotion was used if there was much inflammation. I may mention here his views on wounds of joints. He advocates immediate and close union of the wound in the skin. Then he applies lint dipped in blood, and over this strapping. He covers the knee with linen soaked in a solution of acetate of lead and spirit and places the limb on a splint. As instances of improper treatment, he says:[4] 'If the patient has a poultice applied, or if the utmost attention be not paid to the immediate closure of the wound, inflammation of the synovial membrane arises, and suppuration ensues. In young

[1] *Nouvelle Doctrine Chirurgicale*, 1812.
[2] *The Principles and Practice of Surgery*, 1824.
[3] *On Dislocations*, 1819.
[4] *Lectures on Surgery*, edited by F. Tyrrell, 1827.

and healthy constitutions, these wounds in the largest joints are recovered from, but in the aged and weak they destroy life. . . Recovery from these injuries, when inflammation has followed, is by adhesion, so as to destroy the synovial surface, or else by granulation, when a partial or general ossific anchylosis is the result.'

LARREY [1] (1829) does not believe that it is so much the penetration of the air into the joint—for that very often does not occur—as the accumulation of blood and consequent tension, which give rise to the bad symptoms.

BOYER [2] ascribes the bad results of wounds to the action of air on them; but he also considers that putrid pus is a bad application. His method of treatment was accordingly to apply masses of *charpie* over the wound in the first instance, and to leave this dressing on for several days. In this way he excluded the air till granulations had formed, and he looked on them as sufficient protection of the wound against the influences of the air. He therefore afterwards changed the dressings frequently, in order to remove the putrid pus.

I need not go over his results in compound dislocations, wounds of joints, &c. So far as they are given, they do not differ essentially from the results of others. Thus six cases of wounds of joints are detailed, of which four died, and Phil. Boyer, who edits the work, refers to ten cases, all of which ended unfavourably.

I have included a few writers of the present century along with those of last century, because they merely speak of results obtained by methods practised at that time. The whole facts as yet stated may therefore be taken as showing the state of surgery up to the year 1809.

Let us now methodise the results as yet obtained from an antiseptic point of view.

The bad effects of the air, down to Priestley's discovery, were generally supposed to be due to the temperature of the air. Paré and others had, however, as we have seen, added to this view the further supposition that it carried miasms to the

[1] *Clinique Chirurgicale*, 1829.
[2] *Traité des Maladies Chirurgicales*, &c., edited by P. Boyer, 1844.

wound; while Benjamin Bell first spoke of the bad effects of the gases, more especially of the 'fixed air.' We shall see that this latter view has been more developed in recent times.

Others, looking on the putrefaction of the discharges as a potent source of evil, attempted to prevent this by the application of various balsams and other antiseptics; and, in two instances (Colbatch and Bilguer), with very great success.

Many surgeons, however, saw in the better results of their time merely the effect of simplification of dressings, and, acting on this idea, they reduced their dressings to a minimum. Among those who held this view, and who have not been mentioned, were LOMBARD [1] and PERCY,[2] who, in 1785, learned from an Alsatian that he had an infallible remedy for wounds. This turned out to be river water used along with certain magic utterances. Percy and Lombard employed water henceforth in various ways, and became enthusiastic in its praise.

In 1809 VINCENZ VON KERN published a little book entitled 'Avis aux Chirurgiens, pour les engager à adopter une méthode plus simple, plus naturelle, et moins dispendieuse dans le pansement des blessés.' In his method the wound was washed with tepid water, left open for eight to ten hours, then united with strips of plaster and covered with light compresses dipped in tepid water. To provide a drain the ligatures were all brought out at one part, or else a piece of oiled lint was introduced at one of the angles. The wound was cleansed once or twice daily by washing it with tepid water. In some cases he applied poultices. He says: 'Cold water for arrest of hæmorrhage, then warm water for the dressing, some small pieces of lint, absolute rest, and artificial heat: see! that is all that is necessary for the treatment of any sort of wound.'

Von Kern held, that the ordinary methods of dressing heated the wound and favoured inflammation and suppuration; that they irritated it mechanically and chemically and, in the case of stumps, by their weight, caused retraction of the soft parts. He considers air as not only not hurtful, but in fact useful. 'Folget meinem Beispiele:' he exclaims. 'Durch

[1] *Clinique Chirurgicale relative aux Plaies*, 1798.
[2] *Manuel du Chirurgien d'Armée*, 1792. See also *Opuscules de Médecine*, &c., 1827.

Anwendung dieser Grundsätze werdet ihr den Kriegern unendliche Schmerzen und dem Staate Millionen ersparen.'

Von Kern's method, which was essentially water dressing —a septic dressing—and which I mention chiefly as a matter of history, was adopted by Von Walther in Bonn, and by Fritze in Prague. It was brought to England more especially by Liston, and up till 1860 was pretty generally adopted in this country.

It did not spread much in France; and here is Rochard's[1] explanation, which is well worthy of careful attention: 'Si ce mode de traitement, si rationnel et si économique, n'a pas pu se généraliser en France, cela tient surtout aux conditions hygiéniques des hôpitaux de nos grandes villes. Les Anglais, plus favorisés que nous, ne voient pas l'infection purulente incessamment suspendue sur la tête de leurs malades, et c'est cette menace qui a de tout temps préoccupé les chirurgiens de Paris. *Les pansements à l'eau ne leur ont pas offert contre elle une garantie suffisante; il fallait des préservatifs plus certains*,[2] ou qui du moins parussent l'être, et à l'époque à laquelle nous nous reportons (1860) ils se livraient à cette recherche avec une ardeur et une fécondité d'imagination des plus louables.'

In the further history of this subject we must, up till quite recent times, confine our attention to the progress of wound treatment in other countries. In England, where better hygienic conditions prevailed, this subject was almost entirely neglected; and the chief aim of the surgeon was to perfect the methods and instruments for operating, and to attain great speed and dexterity in the performance of operations.

[1] *Histoire de la Chirurgie Française*, 1875.

[2] The italics are mine.

CHAPTER XV.

HISTORY OF ANTISEPTIC SURGERY—(*continued*).

History of the various methods. Incubation: Guyot. Subcutaneous surgery, preliminary attempts: Stromeyer: Dieffenbach: Jules Guérin: Langenbeck: Other authors. Occlusion: Jules Guérin: Chassaignac—Rochard's remarks: Pansement ouaté—Alphonse Guérin, method and results—Ollier. Substitution of various gases for air: Demarquay and Leconte. Open Method: Bartscher and Vezin: Burow: Humphrey. Healing by scabbing: John Hunter: Neudörfer: Bennion: Lister: Bouisson: Bonnet, etc. Irrigation and the water-bath: early history: Jossé: Bérard: Mayor: Amussat: Langenbeck: Valette.

We must now trace the different modes of treatment to which the ideas as to the cause of the bad effects which often follow wounds have given rise.

Incubation.

As has been already mentioned, the view for a long time was that it was the cooling and drying effect of the air on the wound which had to be guarded against. Since Priestley's discovery this idea has been more or less abandoned; but in 1835 and later, M. Jules Guyot[1] studied the effects of cold, and attempted to found a method of treatment on his views. Guyot adduces evidence from Paré and Larrey to shew that wounds cicatrise most rapidly in warm air. Larrey, in his 'Campagne d'Égypte,' states that the wounds in that hot climate cicatrise with astonishing rapidity; and in his 'Campagne d'Allemagne' he makes the opposite remark as to the deleterious effects of cold. Guyot accordingly made a series of experiments on animals, and found that when wounds were kept at a temperature

[1] *Archives Générales de Médecine*, Vol. VIII. 1835. See also *De l'Incubation et de son Influence thérapeutique*, Paris, 1840; and *De la Chaleur dans le Traitement des Plaies*, 1842.