

CHAPTER XIV.

HISTORY OF ANTISEPTIC SURGERY.

Practice of the ancient writers. Attempts of the ancients to secure immediate union of wounds. Paré and Paracelsus: Delacroix: Arcæus: Progress of wound treatment in the sixteenth century. Seventeenth century: Magatus: Wiseman: Colbatch: Progress in the seventeenth century. Eighteenth century and the early part of the nineteenth: Boerhaave: Col de Villars: Heister: Bilguer: Benjamin Bell: Abernethy: John Hunter's objections to the views of Bell and Abernethy: John Bell: opinions and practice of other surgeons: Conclusions: Von Kern.

ANTISEPTIC surgery being, as we have seen, a very wide term, in endeavouring to take a philosophical view of its history and development, we must trace the development of the methods of wound treatment during the last two centuries at least. In doing so, and in order to avoid repetition when we come to consider the results of the various methods, I shall introduce into this historical part such details of the results obtained as seem to me advisable.

Without entering into details on the practice of the ancient writers, we may look on their modes of treatment as more or less directed to making the wound heal. Thus, substances were applied to *make* the flesh grow, others to *make* the growing flesh firm, and others to *make* the wound cicatrise. Amid all these attempts, the tendency of the *wound itself towards healing* was almost entirely lost sight of. It was supposed that without these applications all sorts of evil results would take place, and healing would not occur. These ideas reigned paramount for centuries; and we find them still advocated, not perhaps in such a glaring manner, up till very recent times.

Nevertheless, there were surgeons who from time to time were bold enough or had insight enough to protest against

these views. Amongst these we may mention PAUL D'EGINETA,¹ who lived probably in the seventh century. He proscribes the numerous plasters, by means of which, he says, the action of nature is choked, and he shows himself not ignorant that it is to nature herself that one must attribute the successive changes that wounds present. ROGERIUS,² in the thirteenth century, also protested against the numerous dressings then in vogue, and used only wine and honey as local applications.

The rule at that time was not to attempt to close the wound, even where that was possible, for it was supposed that all sorts of evil humours would be pent up, and cause constitutional affections. On the contrary, wounds were distended with tents and plugs, which were covered with all manner of ointments, and imbued with various kinds of medicaments. Attempts were, however, made from time to time to procure union. Among those who made these attempts may be mentioned BRUNO,³ in the thirteenth century, who treated wounds differently according as they were simple incised wounds, or wounds with loss of substance. The former he closed at once, while the latter were made to suppurate, except in cases where nerves were injured, where he thought that 'putrefaction might cause spasm:' already we see the germ of the idea, which is at present gaining ground, that there is an intimate relation between tetanus and septic changes in wounds. Similar views were expressed about the same time by LANFRANC,⁴ who wrote at length against the dangers of tents, and who states that the immediate union of wounds ought to be the first aim of the surgeon in all cases of simple wounds, except in the case of a bite by a mad dog.

During the next two centuries, surgeons seem to have forgotten, or not to have paid attention to, the teachings of Bruno and Lanfranc, and to have still continued the practice of endeavouring to remove morbid humours, and of altering the supposed poisonous state of the surface of the wound by numerous and varied applications. The most prominent surgeon of this time was GUY DE CHAULIAC,⁵ the celebrated surgeon

¹ See Portal's *Histoire de l'Anatomie et de la Chirurgie*, 1770.

² *Ibid.*

³ *Ibid.* i. 178.

⁴ *Ibid.* i. 193.

⁵ *Chirurgia Magna*, restituta a L. Jouberto, 1585.

of Montpellier. He used no less than five different ointments in the treatment of a simple wound.

At the end of the fifteenth century, or the beginning of the sixteenth century, a new writer appeared in the person of DE VIGO,¹ who for a time exercised a great influence on the progress of surgery. It was he who elaborated the dogma that gunshot wounds are poisonous, and that they must be burnt. He speaks of the contact of the air with wounds as being very hurtful, and for that reason he unites the edges early, taking care not to leave any blood clots between the cut surfaces. He also objects to the unnecessary use of tents, and only introduces into the wounds lint covered with a digestive made with turpentine. To the wound itself he applied various powders, some of them containing antiseptic substances, and these no doubt assisted to form an antiseptic crust.

In 1542 MICHEL ANGE BLONDUS² wrote on the treatment of wounds by water. After arresting hæmorrhage, and removing foreign bodies, he applied dressings soaked in water.

From this period we begin the real history of modern wound treatment. The two men who were most influential in rescuing this department of surgery from the state into which it had fallen, and in laying the foundation for the more modern methods of treatment, were Paracelsus and Paré.

PHILIPPE-AURÉOLE-THÉOPHRASTE-PARACELSE-BOMBAST³ was born in 1493 at Einsiedeln, near Zürich, and spent the early part of his life at Basle, as teacher of surgery. In his method of treating wounds, he only aimed at aiding nature. He supposes that there is a juice, distributed throughout the body, which keeps the various tissues of the body in good health, and repairs them when they are injured. The whole aim of the surgeon ought to be to prevent alterations in this liquid, resulting either from its contact with air or from other accidents. Nature alone is sufficient for this, as is seen in wounds of the lower animals, and the essential thing is not to interfere with nature. Medicaments are only of use as preserving this juice, and preventing its corruption (putrefaction). In the treatment

¹ *The Most Excellent Workes of Chirurgerye, &c.*, 1543.

² Portal's *Histoire*, i. 381.

³ *Opera Medica Chimica, sive Paradoxa*, 1603-5.

of wounds he employed silver wire sutures, and bathed or injected the wound with a solution of acetate of lead.

These views were adopted by AMBROISE PARÉ (1509-1584?).¹ He says:—'Le chirurgien, pour la curation des playes, se doit proposer une commune indication, qui est, union des parties divisées' . . . 'Or ceste première et générale indication est parfaite par nature comme le principal agent, et par le chirurgien comme ministre de nature; et si nature n'est forte, le chirurgien ne pourra venir à sa fin prétendue.' Paré mentions a variety of topical applications, but his great aim is to keep the part at rest. 'Preserve the temper of a wound by low diet, a little wine, and rest; avoid venery, contentions, brawls, angers and other perturbations of the mind.' As is well known, he was the first to show that gunshot wounds were not poisonous. He simply enlarged these, and extracted any foreign bodies, and then applied suppurative medicines. He regarded wounds of joints as very fatal, and for the most part deadly, and here he counsels the application of Venice turpentine, and not of suppurative medicines. His views with regard to air are interesting. He looked on pure air as rather beneficial to the wound, and to the patient, but the air of sick rooms, camps, &c., is generally, as he supposed, loaded with miasms, and therefore very dangerous, and it is the miasms in the air rather than the air itself, which are the source of the danger.

It was chiefly by the writings and teachings of these two men, that the ideas that the wound must be fed, that bad humours must be removed, and that wounds cannot heal without constant meddling, gave place to the true view that nature is the only agent in the healing of wounds, and that all that we can or ought to do is to remove anything which interferes with its proper action. Paré looked more especially to the constitution. He strengthened the body as a whole, while removing, as far as he knew, any local disturbing causes. The former is, however, the point which he considered the most important.

JEAN ANDRÉ DELACROIX (1573)² was one of the most suc-

¹ *Œuvres Complètes, par J. F. Malgaigne*, 1840. See also *The Works of that famous Chirurgion*, translated by Thomas Johnston, 1665.

² Portal's *Histoire*, ii. 41.

cessful surgeons of that time, and adopted the views just related as to the powers of nature. He used antiseptic substances very largely. Thus he recommends strongly, as applications to wounds, ethereal oils and substances containing alcohol. After the bleeding had been arrested and foreign bodies removed, he washed out the wounds with some 'detergent liquid,' and then applied plasters containing chiefly pitch and oil of turpentine. His results were exceptionally good.

The bad effects of the air were much feared by WÜRTZ,¹ who, in order to prevent its access to wounds, kept the doors of the sick room closely shut while he rapidly changed his dressings.

FALLOPIUS² also, about the same time, from the same fear of the air, made a number of experiments on healing under a crust.

The method of treatment employed by FRANÇOIS ARCÆUS³ (1574) was more simple than any of the others used up to that time. Having arrested bleeding, and removed foreign bodies, he washed the wound with alcohol, or with wine containing myrrh or other similar substances, and brought the edges together with sutures, leaving an opening which could be kept open, if necessary, by a piece of lint introduced into it. He then applied a balsam, which afterwards attained great celebrity, and which he describes as follows:—'Prenez térébenthine claire et baume élémi une once et demie de chacun; de la graisse d'un animal châtré, deux onces; vieille graisse de porc, une once. Faites foudre tous ces ingrédients à un feu modéré, et vous aurez un liniment que vous ferez foudre toutes les fois que vous voudrez vous en servir. Vous en oindrez la plaie avec une plume et vous couvrirez le tout avec un emplâtre de Vigo.' He had some remarkable results by the use of this method, which really is a fair antiseptic method, and not far removed from an aseptic one.

VICARY,⁴ towards the end of the same century, washed out wounds with a balsamic water, stitched them up, and covered

¹ *Practica der Wundartzney*, Basel, 1596.

² *Opera Omnia*, 1600-6.

³ *A most Excellent and Compendious Method of curing Woundes in the Head and in other Parts of the Body*, translated by John Read, 1588.

⁴ *The Englishman's Treasure, &c.*, 1626.

them with various balsams, and he speaks of the excellent results which he obtained in this way.

The great advance in this century was the reassertion of the part played by nature, and the abandonment of the ideas of feeding wounds or of making flesh. Here also we have the first strong recommendation to apply antiseptics to wounds, and the success of these applications, in the hands of Arcæus more especially, is vouched for by the fame which his balsam afterwards acquired. Nevertheless, as such methods were simply the result of chance, and did not arise from any glimpse of the true principles which were at work in obtaining the good results, they never became established modes of treatment. During this century, two writers more especially, Paracelsus and Würtz, looked on the admission of air to wounds as a very bad thing, while Paré went the length of ascribing the harm not so much to the air as to miasms contained in it.

Seventeenth Century.

The evil effects of air were, however, most prominently brought forward by MAGATUS¹ (1516), to whom also must be accorded the credit of having first thoroughly recognised the importance of rest in the treatment of wounds. He says that the air is charged with miasms, which infect the parts with which they come in contact. He points out as an instance of this, the rapid putrefaction of an egg if a hole is made into it. He also writes strongly in favour of perfect mechanical rest, for he thinks that movement is a frequent cause of the bad results which follow wounds. With the view of obtaining both objects, the exclusion of air and perfect rest, he recommends very infrequent changing of the dressings; indeed, he only changed them when it became absolutely necessary. He left spaces between the sutures for the escape of pus, but he objected strongly to the use of tents. He did not wipe away the pus from a wound, because he thought that it ultimately formed the cicatrix, and in the meantime protected the wound.

These infrequent dressings, owing to fear of bad effects from the contact of air with the wound, were, as we now know, the outcome of a wrong theory; and although Magatus's teaching exercised great influence down to recent times, yet in the case

¹ *De rara Medicatione Vulnerum*, 1616.

of those who have studied and acted on his views, the reaction has been so great when they have discovered how insufficient they were, that the good points in his method were for a long time likewise rejected.

During this seventeenth century, there was but little progress made. The accumulation of dressings, which had been given up to some extent at the commencement of the century, had been again introduced, chiefly as the result of Magatus's teaching on the bad effects of air. These dressings contained, however, balsams and other antiseptics of various kinds, and thus the bad effects which must have arisen from keeping putrid dressings in contact with wounds for a long time, may have been to some extent avoided.

It is interesting to note, in reference to our future consideration of the results of various methods of wound treatment, that Magatus's method by no means did away with the dangers of such injuries as incisions into joints. Thus, to quote from JAMES COOKE's 'Marrow of Chirurgery' (1685); under 'Wounds of Joints,' he says: 'If a wound associate to a dislocation so that the joynt be bar'd and a little thrust out of the skin; in great joynts 'tis deadly, in all bad: yea, after set, there oft follows inflammation, convulsion, &c., especially if withal there be a fracture near the joynt.'

That advance was being made, and that the teachings of Magatus were not blindly followed, is evident, for example, from the writings of RICHARD WISEMAN¹ (1692). Wiseman's views on the healing of wounds and his methods of treatment were remarkably good. In uniting the edges of a wound, he says that one must not force a pledget of lint between the lips, nor use violence. Unite the parts gently and equally; then 'preserve the natural temperament of the part, that thereby agglutination may be obtained.' Agglutination is the work of nature alone. Blood is the natural glue, and hence great care must be taken that it is good. Attend therefore to diet and regimen. Support the patient's strength. Do not stop strong drinks, if the patient has been accustomed to them. Do not purge; but, if necessary, give gentle laxatives. He used as applications to wounds such remedies as turpentine, and outside this he applied

¹ *Chirurgical Treatises*, 1692.

cooling and astringent lotions. Powders of various kinds were sprinkled over the larger wounds.

At the end of the seventeenth century appeared a most remarkable series of treatises by SIR JOHN COLBATCH,¹ in which he describes results obtained by the use of a medicament, which he unfortunately does not mention, but which gave him results only comparable to the true aseptic results obtained at the present day by the use of the aseptic method. That he should have concealed the name of the substance employed cannot be too much regretted; but that nevertheless he was no ignorant quack, telling falsehoods simply to sell his wares, is shown by the position which he ultimately attained in his profession. The accuracy of his results are also attested partly by the publicity with which they were obtained, but chiefly by the clearness of the description which he gives of the progress of his cases—a progress which could not at that time have been imagined by any one who had not seen the facts. A typical aseptic course is described, while there is no doubt that he had observed vascularisation of the blood clot, and its replacement by new tissue, just as has been described in the present day by Mr. Lister.

In his preface he asserts 'that the method of chirurgery hitherto used is not the best; that all probes and tents, all digestive and suppurating medicines, all cauterizing and straight ligatures are injurious to the patients, and procrastinate their cure.' His view is, that when a wound is made the 'nutritious juice' escapes from the vessels. 'Now all the medicines used in the common methods of chirurgery are of such a nature as to relax the divided fibres so much, that they cannot contain the nutritious matter brought to them, but let it pass into the wound, where it is by the same medicines corrupted and turned into that substance we commonly call matter. Now the corruption of the nutritious juice cannot be performed without a sort of fermentation, and it is the fermenting particles that, fretting the fibres, cause inflammation in wounds, and by entering into the blood, and dividing its texture, cause symptomatic fevers, which frequently prove so fatal.' He then goes on to say that by the medicines in common use surgeons cause suppuration

¹ *Novum Lumen chirurgicum*, &c., by Sir John Colbatch, 1704.

and often mortification, 'and when nature is almost tired and oppressed, weak as she is, they leave her to do her own work.' In the cases where the cavities of the body are wounded, the patient is considered certain to die; 'for to bring a wound in the lungs, liver, guts, &c., to suppuration is to bring certain death, and to cure a wound without bringing it to suppuration, they don't pretend.' He then refers to the fact that in all wounds the patients were put on low diet, and more often than not blood was taken in large quantities, 'to the great weakening of their patients.'

As to Colbatch's method. 'Suppose a wound be made with a sword, or other cutting instrument, the length or depth of which signifies nothing, I make a solution of my *Powder* in water, for want of which, in urin; and as soon as conveniently I can—the sooner the better—I either squeeze, or with a *syringe*, if the wound be deep, inject into the wound some of the said solution; I then close the lips of the wound together, which, if wide and large, I stitch up. When I have so done, I apply a pledget of fine tow, wet in the said solution, to the wound; not letting it go into it, but only to cover the edges of it, and lie all over it. And if there chances to be any large artery cut, I hold on the pledget close with my hand till the flux of blood ceases, which will be in a small time, otherwise not' (he speaks of his medicine as a hæmostatic); 'afterwards I bind it on with a very easy ligature, then I give my tincture in wine.' In incised wounds *one* dressing, or at most *two*, were as many as were requisite, the second being applied at the end of three or four days. In wounds with loss of substance more dressings were necessary, and these were changed once in four days.

As to his results, he says:—

'First of all, my medicines never cause any pain, unless it be just when the external one is squeezed or injected into the wound, and that pain is little more than what would be caused by using spring water in the same manner.

'Secondly, there is no pain afterwards, but the parts are pliant and easy, as if not hurt at all.

'Thirdly, if there has bin great pain before, according as it has bin greater or less, so it has bin longer or shorter before taken off, but the greatest in a short time. As when a

wound had bin long received, and had other applications to it before mine, had bin much inflam'd and the parts adjacent much swell'd, and consequently the party in great pain, all these symptoms have bin totally taken off in twenty-four or forty-eight hours at furthest and many times in such cases the greatest pain taken off in a few minutes. But they have never bin the cause of pain, swelling, or inflammation, which, by the way, is a certain argument they are no caustics, as some maliciously and falsely report.

'Fourthly, there has never any such thing as a fever, let the wound be internal or external, attended any who have used my medicine soon after they have bin wounded; but several who have bin ill-managed before, and thrown into violent fevers, have in twenty-four hours, by the use of my medicines, bin totally freed from them, and that without blood-letting or abstaining from flesh or wine, the more of which they drink, so they keep within bounds, I always find them the better.

'Fifthly, in all incised wounds, where my medicines have bin soon enough used, and no other applications preceded, they are perfectly cured in a few days without suppuration, and I have frequently observed that at about four days' end, such wounds have bin filled with a *substance much like hartshorn jelly*, which I have conjectured to be young flesh, and in two or three days I have found my conjectures true, the said substance being converted into good flesh. But where wounds have bin long receiv'd and matter generated, they have bin cured in a small time, without repeating the application above once in three or four days. I have had to do with wounds long received, which have bin both deep and large, and by the common methods must have discharged a great quantity of matter, but the quantity of matter coming away after using the medicines, has bin so small, that I have good reason to conjecture it was no more than what was formed before they were applied.'

These statements correspond very much with what are now made by the supporters of the aseptic method, and they could hardly, more especially where he seems to describe organisation of blood clot, have been imagined at that time. Supposing that this powder were an antiseptic, the method employed is

practically the same as that which I have described when no spray is at hand: fill the wound with the antiseptic lotion; stitch up and apply your antiseptic dressing. Neudörfer, who also mentions Colbatch, thinks that this powder was a salicylate; probably, on account of the smell of roses to which Colbatch refers, salicylate of ammonia.

Thus in the seventeenth century but little real progress was made. The great aim was to exclude the air, and to avoid mechanical causes of unrest; the chemical causes of unrest were not at all understood. Colbatch's method seems to have been completely lost, no doubt on account of his concealment of the nature of the substance used.

Eighteenth Century and the Commencement of the Nineteenth.

AUGUSTIN BELLOSTE¹ (1700) reiterates Magatus's teaching. He fears the contact of the air, chiefly on account of the miasms which it contains, and in order to exclude these, and also in order to obtain mechanical rest, he recommends infrequent dressings. He fills his wounds with *charpie* and follows Magatus in not washing away the pus. He advocates immediate union in cases where bones are divided. 'L'expérience m'a fait voir,' says he, 'en mille occasions que quand un os est simplement découvert, tout consiste, pour en éviter l'altération, à le défendre des attaques de l'air. Pour cet effet, il faut procurer la réunion de la plaie le plus tôt qu'il sera possible, par le moyen des bandages propres et des remèdes balsamiques, sans la dilater avec les tentes et les bourdonnets; par là l'os se recouvre promptement, et on évite l'exfoliation, qui est absolument nécessaire quand on a donné le temps à l'air d'y faire ses impressions.'

In 1706 PARMANUS² speaks of a lotion which he uses for wounds, which 'resists putrefaction, prevents ill accidents, and takes away the inflammation and pain of the wound.' His dressings were kept constantly moist with this lotion, and changed once in two or three days.

In the same year ANEL³ published an account of a method of

¹ *Le chirurgien d'Hôpital*, 1707.

² *Chirurgia Curiosa*, 1706.

³ Portal's *Histoire*, iv. 398.

evacuating abscesses by aspiration, without leaving an open wound. A similar kind of instrument for the purpose of removing blood from the thorax had been previously described by Delacroix (1573).

As we have seen, the dread which surgeons as a rule up to this time entertained of admitting air to wounds was not so much because it caused putrefaction of the discharges of wounds, but because it contained miasms which were hurtful to the patient. The connection between internal abscesses and wounds had been hardly as yet observed, and it was not till Boerhaave wrote, that this connection was recognised, and that a *putrid* discharge in a wound became a thing to be avoided.¹

BOERHAAVE² (1720) pointed out the frequency of internal abscesses after certain injuries, and he ascribed this to the absorption of pus by the open orifices of the veins of the wound. Boerhaave went further, and ascribed the evil effects to the *putridity* of the pus. This is very evident in the following quotations, which Jeannel (Pyohémie) gives from Boerhaave's aphorisms: 'Si tum relinquitur (pus) diù in loco clauso, attenuatur, acre fit, putrescit, augetur, vicina consumit, erodit, mole, pondere et motu sinus fistulasque creat variis locis, varias, pessimas in intestino recto;' and also, 'Aut dissipata parte tenuiori reliquum durescens tumores duros, maxime circa glandulos creat, vel denique (pus) venis lymphaticis aut sanguiferis, per eroso osculo impressum absorbetur,' &c. Jeannel also quotes passages from Paré to show that he attributed the fever which accompanied wounds to a putrefaction of the pus.

Boerhaave's views were adopted by LE DRAN³ and HEISTER; and, in 1741, we find the necessity of frequent dressings, in order to prevent putrefaction, strongly urged by COL DE VILLARS.⁴ The latter author advises that if there be much suppuration, the dressing should be changed twice a day. He

¹ That wounds of the skull were apt to be followed by abscesses in the liver was long before noticed by Paré and others, but the significance of the fact was not understood.

² *Aphorisms concerning the Knowledge and Cure of Disease*, translated by Delacoste, 1715.

³ Billroth, *Historische Studien über die Beurtheilungen der Schusswunden*, 1859.

⁴ *Cours de Chirurgie*, ii. 1741.