

1867-71.			
	Cases	Deaths	From pyæmia and septicæmia
Thigh	11	2	0
Leg	31	9	5
Humerus	13	2	0
Fore-arm	10	1	0
Total	65	14*	5†

* Or a mortality of 21.5 p. c. † 7.6 p. c.

Krönlein does not give full details of the causes of death during either period, so that one cannot judge for one's self how far they were avoidable or not. He confines his attention to infective diseases.

If we analyse Krönlein's tables of amputations in the same way as was done on p. 387, for the septic and aseptic tables, i.e., if we only consider uncomplicated amputations, leaving out of consideration double amputations, amputations where other injuries were present, amputations in patients already suffering from septic poisoning, &c., we get the following results in cases treated by the somewhat modified open method described above:—

Uncomplicated Amputations.

(1867-71.)

	Cases	Deaths
Humerus	13	3
Fore-arm	8	0
Hand	7	0
Thigh	22	5
Leg	5	0
Partial of foot	12	3
Total	67	11

or a mortality of 16.4 p. c. as compared with Schede's result in aseptic cases of 4.4 p. c. Of these deaths one occurred from shock; in five no cause of death is given; four died from pyæmia; and one from erysipelas.

Between 1860 and 1867 about 4,000 patients, suffering from all sorts of affections, were treated in the surgical wards at Zürich, and of these 146 died of pyæmia and septicæmia.

Between 1867 and 1871 about 2,300 similar cases were treated. Of these only 19 died of pyæmia and septicæmia.

Among the 4,000 patients of the first period erysipelas oc-

curred 148 times. Among the 2,300 patients of the second period erysipelas occurred 127 times.

We thus see, that a treatment consisting of a combination of the open method with intermittent irrigation and treatment with antiseptics reduced in a very marked degree the mortality from pyæmia and septicæmia, but did not affect erysipelas at all. What the open method alone would have done we do not know, but these results are very good in a hospital where infective diseases were prevalent. Krönlein himself says that these cases 'sufficiently show that the open method is no absolute guarantee against pyæmia and septicæmia.' He also states that 'the open method does nothing against erysipelas; indeed, during the time in which the open method was employed, erysipelas was more frequently observed than formerly.'

We have also already seen from the experiences of Nussbaum and Volkmann, that the open method is not very powerful against septic diseases in infected hospitals. Thus, for example, Volkmann states that at first he was an advocate of the open method, but that by-and-by, as the hospital became more and more unhealthy, the treatment became of less and less value.

I may, in contrast to the results of the foregoing methods, give a few statistical tables of cases not treated aseptically at all.

Billroth's results just quoted in Krönlein's book represent the mortality after operations not treated aseptically.

Malgaigne's statistics¹ are well known. The following table of amputations represents the results obtained in Paris at the time when he wrote.

Amputation of	Cases	Deaths
thigh	201	126 = mortality of 62.6 p. c.
" " leg	192	106 = " " 55.2 "
Partial of foot	38	9 = " " 23.6 "
Shoulder-joint	13	10 = " " 76.9 "
Humerus	91	41 = " " 45 "
Fore-arm	28	8 = " " 28.5 "
Total	563	300 = " " 53.2 "

¹ *Archives générales de Médecine*, 1842.

Paul¹ has collected a very extensive series of statistics, of which the following is a sample.

	Cases	Deaths	
Amputation at hip-joint . . .	222	159 =	mortality of 71.6 p. c.
" through femur . . .	1721	863 =	" " 50.1 "
" at shoulder-joint . . .	192	84 =	" " 43.7 "
" " knee-joint . . .	49	24 =	" " 40.9 "
" through leg . . .	1242	480 =	" " 38.7 "
" " humerus . . .	943	314 =	" " 33.3 "
" " fore-arm . . .	391	73 =	" " 18.7 "
Total . . .	5,060	1,997 =	39.4

Mr. Holmes in 1866² gave statistics of the last 300 amputations performed at St. George's Hospital. Of these, eighty-three or 27.6 p. c. died. In 1874³ he published statistics of the last 500 cases of amputation, and, of these, 158 or 31.6 p. c. died. It thus appears that of the last 200 amputations performed at St. George's Hospital between 1866 and 1874, 75 or 37.6 p. c., died. This result shows that but little benefit had been derived from the recent improvements in surgery as regards cleanliness, &c., apart from the use of strict aseptic treatment, because the majority of these cases were treated after attention had been called to the subject by Mr. Lister's writings.

Mr. Erichsen⁴ says that the mortality after great amputations varies from 35 to 50 p. c.

The results obtained at St. Bartholomew's Hospital were brought forward by Mr. Savory at the meeting of the British Medical Association at Cork⁵ in 1879 to show what could be done simply by cleanliness and good air independently of aseptic treatment. The report published in 1880⁶ shows that of 619 operation cases of all kinds (excluding eye operations) 45 or 7.2 p. c. died. Many of these operations were of very minor importance indeed. They included, however, 73 major amputations with 11 deaths; 13 excisions of joints with 4

¹ *Die conservative Chirurgie der Glieder*, Breslau, 1854.

² *St. George's Hospital Reports*, vol. i. ³ *Ibid.* vol. viii.

⁴ 'On Hospitalism and the Causes of Death after Operations,' 1874.

⁵ *British Medical Journal*, August, 1879.

⁶ *St. Bartholomew's Hospital Reports*.

deaths; 29 cases of removal of tumours of the mamma, no death; 13 cases of removal of tumours of the tongue, 1 death; 4 lithotomies, no death; 32 herniotomies, 6 deaths; 25 tenotomies, 1 death; 74 operations for phimosis; 36 cases of fistula in ano, &c.

Among the 45 deaths were 9 from pyæmia and four from erysipelas. The causes of death in the other cases are not given. Erysipelas attacked 17 cases operated on, and 11 others. One very striking case is mentioned. The femoral artery was ligatured with various aseptic precautions for popliteal aneurism. The wound did well till the twelfth day, when hæmorrhage occurred. It was then re-opened without aseptic precautions, and the patient died of pyæmia.

Thus, by the use of cleanliness alone, infective diseases are by no means banished from St. Bartholomew's Hospital. Indeed, in considering these results, it must be remembered that a considerable number of the cases were operated on aseptically. How many cases were treated by good surgery and cleanliness alone, without aseptic precautions, and with what results, we do not know.

Very good results obtained by methods which are not very powerfully antiseptic were published in the spring of 1880 by Dr. McVail.¹ During the preceding three years 107 operations had been performed of which 50 were major operations. Of these 50 cases, 3 died. Among them were 31 major amputations, and the three deaths occurred in these cases; in one it was due to internal injuries; in one it followed gangrene of the back, due to contusion; and in one pyæmia was the cause. The onset of the pyæmia in the last case is said to have followed the opening of an abscess over the sacrum, and death followed within forty-eight hours—a very rapid course for pyæmia! Was it simply a case of sapræmia, or was the abscess part of the pyæmia? Then there were 3 cases in which joints were opened, viz., one compound dislocation of the elbow, which was reduced, but the local result is not given; one case of excision of the head of the radius, result not mentioned; and one case of excision of a metacarpal bone in which some joint was opened.

¹ *British Medical Journal*.

Of course these are a very small number of operations in three years, and they were treated in a country hospital, so that the result is not at all surprising; but when Dr. McVail attempts to draw extensive conclusions from them, and to show that the method of treatment adopted in these cases is better than the aseptic method, he is using a fallacious argument. All that can be said is that under the conditions in which these operations were performed, aseptic treatment was but little necessary, though even here we find that one out of 31 major amputations died of pyæmia. As we have seen, the best surgeons, Mr. Spence or Mr. Savory for instance, even with the use of the most scrupulous cleanliness, cannot reckon on anything like absence of infective diseases.

After all, these statistics are not nearly so good as the results obtained by Bardenheuer with aseptic treatment in the Cologne Infirmary in one year.¹ He had *no death* among 133 aseptic operations involving bones. These included, according to MacCormac—

- 41 amputations (17 of thigh) through bones.
- 10 „ at joints (1 at hip).
- 53 resections (15 of hip and 12 of knee).
- 23 cases of removal of wedge-shaped pieces of bone.
- 5 operations for badly united fracture.
- 1 case of trephining.

¹ MacCormac's *Antiseptic Surgery*, p. 29.

CHAPTER XVIII.

RESULTS OF ANTISEPTIC SURGERY (*continued*).

General considerations. Wounds of, and operations on, healthy joints. Method of treatment adopted in these cases. Definition of the term 'Aseptic course.' Example. Wounds of healthy joints. Operations on healthy joints. Objections to the value of these cases: reply. Incisions into joints affected with synovitis. Incisions into joints affected with pulpy degeneration of the synovial membrane—*a* without suppuration, *b* with suppuration. Volkmann's results: Max Schede: Paul Barth: Saxtorph: Piéchaud: Nussbaum: Albert: Hueter: Létiévant: Kraske: Reyher: Bergmann. Comparison of Reyher's results with those obtained during the Crimean war, and with Heintzel's. Treatment by irrigation. Necessity for observing the minutest precautions as shown by Mr. Lister's case. Results of removing foreign bodies from joints without aseptic precautions: Larrey: Spence: Paget.

So far I have been dealing with general statements; and though these are often not of much use, yet I cannot think that there can be any doubt as to the great value of the facts which I have narrated. Thus, for example, we have had an opportunity of comparing Mr. Lister's results in Glasgow before and after the introduction of aseptic treatment. After he went to Edinburgh, we were able to trace a very marked improvement following the introduction of the aseptic method; and we also had the opportunity of contrasting the results of aseptic treatment with those of treatment by antiseptics in Mr. Lister's own hands. We were further able to point out that there was a great difference between these results and those obtained during the greater part of the same period, in the same hospital, and under more favourable hygienic conditions, by a surgeon who did not practise aseptic treatment.

We have further had most striking evidence from abroad showing that in infected hospitals the aseptic method has done what other methods, such as the open method, treatment by