diseases was one of the matters to which the committee directed especial attention. The questions upon the circular read as follows: (a) "Any symptoms of rickets present? (b) Slight or well marked? (c) What relation in time of development did they bear to the scurvy?" Satisfactory answers were received in 340 cases; in 152 of these (45 per cent.) there were symptoms of rickets present, slight in 72, marked in 64, and the degree not mentioned in 16. In the remaining cases (55 per cent.) rickets is definitely stated to have been absent. With regard to the relation in time of development, it is stated in 50 cases that the rickets was first present; in 14 that it developed with the scurvy, and in 2 after it. There does not seem to be evidence as far as this investigation teaches that the association of rickets and scurvy is at all intimate. Very possibly the same defect in diet which produced the one produced the other also, but the rapid recovery under treatment which the scurvy underwent did not apply to the rickets. This seems to indicate only accidental association of the two diseases; certainly not any causal relation between them.

OTHER COMPLICATING CONDITIONS.—A variety of affections are mentioned complicating scurvy in a number of cases as follows:

Bronchitis, 5; cretinism, 1; enlargement of inguinal glands, 1; "cerebral symptoms," 1; convulsions, 1; pneumonia, 2; boils, 1; irritability, 1; vomiting, 4; eczema, 2; enuresis, 1; sweating of the head, 1; tympanites, 1; caput medusæ, 1; diaphoresis, 1; pertussis, 2; insomnia, 1; anorexia, 2; post nasal discharge, 1; measles, 1; restlessness, 1; phimosi, 1; indigestion, 2; laryngismus stridulus, 1; cystitis, 1.

(To be continued.)

MAJOR AMPUTATIONS AT THE MASSACHUSETTS GENERAL HOSPITAL.

A STUDY OF THE MORTALITY FROM 1822 TO 1896.

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The major amputations done at the Massachusetts General Hospital from 1822 to 1870 were compiled by Dr. James R. Chadwick in elaborate and carefully prepared tables, and were published in May, 1871.

It was found that during the first period, the pre-antiseptic period, 699 amputations of the limbs had been done. The mortality percentage for this period has been recorded in the table following:

MORTALITY PERCENTAGES FOR THE FIRST PERIOD, 1822-1870.

1. Amputation at the Shoulder-Joint.		
Traumatic, primary	53.33	
Pathological	27.27	
2. Amputation of the Arm.		
Traumatic, primary	19.44	
Traumatic, secondary . . . . .	....	
Pathological	12.50	
3. Amputation of the Forearm.		
Traumatic, primary	24.13	
Traumatic, secondary . . . . .	....	
Pathological	14.81	
4. Amputation of the Thigh.		
Traumatic, primary	42.37	
Traumatic, secondary	60.00	
Pathological	20.98	
5. Amputation at the Knee-Joint.		
Traumatic, primary	60.00	
Traumatic, secondary . . . . .	....	
Pathological	36.36	
6. Amputation of the Leg.		
Traumatic, primary	34.37	
Traumatic, secondary	36.41	
Pathological	12.60	

At the Massachusetts General Hospital, between the years 1870 and 1890, the second period, for a space of twenty years 657 major amputations have been performed.

Through imperfections in the records two cases are not complete enough to include in this report.

The anatomical groups of cases are subdivided into those cases operated upon for disease and for traumatism, that is, pathological and traumatic groups, and this last group is further divided into primary and secondary classes, according as the amputation was done within or after the twenty-four hours immediately following the accident.

After a careful analysis of these groups of cases, I have determined the average mortality in each, and the causes of death in so far as the records would allow.

There was one amputation at the hip-joint during this period, with recovery. There has been one amputation at the elbow-joint, which died. There have been four amputations at the ankle-joint and four amputations at the wrist-joint, with no mortality. There have been 38 cases of partial amputation of the foot. There have been 77 amputations of fingers and toes.

These cases mentioned above are not included in the estimates of mortality of the major amputations given below.

AMPUTATIONS AT THE SHOULDER-JOINT.

Traumatic, Primary.—Recovered, 7 cases; died, 7; total, 14. Mortality, 50 per cent. Causes of death: from shock, 6 cases; internal hemorrhage, 1. The accidents necessitating these amputations were crushes, which in almost every instance caused extensive injury to the parts adjacent to the shoulder and arm; hence the great shock, which caused death.

Pathological.—Recovered, 3 cases; died, 0; total, 3.

AMPUTATIONS OF THE UPPER ARM.

Traumatic, Primary.—Recovered, 36 cases; died, 5; total, 41. Mortality, 12.19 per cent. Causes of death: from shock, 4 cases; hemorrhage, 1.

Pathological.—Recovered, 26 cases; died, 5; total, 31. Mortality, 16.12 per cent. Causes of death: from shock, 3 cases; record incomplete, 2.

AMPUTATIONS OF THE FOREARM.

Traumatic, Primary.—Recovered, 37 cases; died, 11; total, 48. Mortality, 22.99 per cent. Causes of death: from shock, 5 cases; secondary hemorrhage, 2; ether, 1 (the autopsy showed no lesion to account for death); sepsis, 2; fracture of base of the skull, 1.

Pathological.—Recovered, 22 cases; died, 3; total, 25. Mortality, 14 per cent. Causes of death: tetanus, 2 cases; uremia, 1.

AMPUTATIONS OF THE LEG.

Traumatic, Primary.—Recovered, 86 cases; died, 33; total, 119. Mortality, 27.73 per cent. Causes of death: from delirium tremens, 1 case; secondary hemorrhage, 1 case in 1877; fat embolus, 1; internal injuries, 1; carbolic-acid poisoning, 1; shock, 17; sepsis, 11 (two of these cases became septic from gangrene of the part. Eighty-eight of these cases were railroad accidents, and of these 88 cases, 23 died).

Traumatic, Secondary.—Recovered, 22 cases; died, 6; total, 28. Mortality, 21.43 per cent. Causes of death: from sepsis 4 cases; shock, 2.

Pathological.—Recovered, 100 cases; died, 16; total, 116. Mortality, 13.78 per cent. Six of these deaths occurred previous to 1879, and were due to sepsis. Seven of these deaths occurred in elderly people, the amputation

being done in five cases for senile gangrene, in two cases for traumatic gangrene. One death was due to general tuberculosis; one death was due to exhaustion, four days after the operation; one death was due to pneumonia.

AMPUTATIONS AT THE KNEE-JOINT.

Pathological. — Recovered, 6 cases; died, 6; total, 12. Mortality, 50 per cent. Two deaths were from sepsis, prior to 1873. One death in 1879 was due to carbolic-acid poisoning. One death was due to tetanus, 1871. One death, the patient did not recover from ether, 1879. One death from secondary hemorrhage, 1872.

Traumatic, Primary. — Recovered, 4 cases; died, 6; total, 10. Mortality, 60 per cent. Causes of death: from sepsis, 2 cases; carbolic-acid poisoning, 1 case in 1879; tetanus, 1; ether, 1; secondary hemorrhage, 1.

Traumatic, Secondary. — Recovered, 10 cases; died, 12; total, 22. Mortality, 54.54 per cent.

AMPUTATIONS OF THE THIGH.

Traumatic, Primary. — Recovered, 32 cases; died, 29; total, 61. Mortality, 47.54 per cent. Forty-six of these cases were railroad accidents, of which 21 died and 25 recovered. Of the 29 deaths, 24 cases died of shock, 4 of sepsis, 1 of pneumonia.

Traumatic, Secondary. — Recovered, 5 cases; died, 2; total, 7. Mortality, 28.5 per cent. The injuries necessitating amputation of the thigh were so severe as to cause often multiple lesions. The combination of all these lesions caused great shock producing death in many cases.

Pathological. — Recovered, 56 cases; died, 17; total, 73. Mortality, 23.28 per cent. Eight deaths due to sepsis; 6 to shock; 2 to carbolic-acid poisoning; 1 to secondary hemorrhage.

MORTALITY PERCENTAGES FOR THE SECOND PERIOD, 1870-1890.

1. Amputation at the Shoulder-Joint.	
Traumatic, primary	50.
Pathological	0.
2. Amputation of the Arm.	
Traumatic, primary	12.19
Traumatic, secondary . . . . .	....
Pathological	16.12
3. Amputation of the Forearm.	
Traumatic, primary	22.99
Traumatic, secondary . . . . .	....
Pathological	14.00
4. Amputation of the Thigh.	
Traumatic, primary	47.54
Traumatic, secondary	28.05
Pathological	23.28
5. Amputation at the Knee-Joint.	
Traumatic, primary	60.00
Traumatic, secondary . . . . .	....
Pathological	50.00
6. Amputation of the Leg.	
Traumatic, primary	27.73
Traumatic, secondary	21.43
Pathological	13.78

During the years from January, 1885, to December, 1896, the third period, there have been performed 670 amputations.

AMPUTATIONS AT THE SHOULDER-JOINT.

Traumatic, Primary. — Recovered, 13 cases; died, 6; total, 19. Mortality, 31.57 per cent. These cases all died from shock a few hours after amputation.

Traumatic, Secondary. — One case which died of shock.

Pathological. — Recovered, 2 cases; died, none. One of these cases was a sarcoma of the forearm and one case sarcoma of the humerus.

AMPUTATIONS OF THE UPPER ARM.

Traumatic, Primary. — Recovered, 42 cases; died, 12; total, 54. Mortality, 22.22 per cent.

Traumatic, Secondary. — Recovered, 9 cases; died, 2; total, 11. Mortality, 18.18 per cent.

Pathological. — Recovered, 16 cases; died, 2; total, 18. Mortality, 11.11 per cent. The cause of death in one case was sepsis. The diseases for which amputation was done were: Sarcoma, 6 cases; tuberculosis, 2; painful stump,

3 (one died); epithelioma, 2 (one died); paralysis, 2; gangrene, 3; total of 18 cases, 2 deaths.

AMPUTATIONS OF THE FOREARM.

Traumatic, Primary. — Recovered, 47 cases; died, 3; total, 50. Mortality, 6 per cent. The deaths were due to shock.

Traumatic, Secondary. — Recovered, 4 cases; total, 4.

Pathological. — Recovered, 32 cases; died, 3; total, 35. Mortality, 8.57 per cent. The diseases for which amputation was done were: sarcoma, 2 cases; carcinoma, 8 (1 died from exhaustion); tuberculosis, 14 (1 died from exhaustion); painful stump, 4; septic hand, 3; gangrene (traumatic and diabetic), 3; tetanus, 1 (died); total, 35; 3 deaths.

AMPUTATIONS OF THE LEG.

Traumatic, Primary. — Recovered, 158 cases; died, 25; total, 183. Mortality, 13.66 per cent.

Traumatic, Secondary. — Recovered, 13 cases; died, 1; total, 14. Mortality, 7.14 per cent.

Pathological. — Recovered, 102 cases; died, 16; total, 118. Mortality, 13.55 per cent. Diseases for which amputation was done and the cases died: compound fracture of the leg, 1 case; carcinoma of leg, 1; gangrene (traumatic 5, diabetic 4, senile 5), 14; total deaths, 16 cases.

AMPUTATIONS AT THE KNEE-JOINT.

Traumatic, Primary. — Recovered, 1 case; died, 1; total, 2. Mortality, 50 per cent.

Pathological. — Recovered, 3 cases. Diseases: elephantiasis, carcinoma, traumatic gangrene, one case each.

AMPUTATIONS OF THE THIGH.

Traumatic, Primary. — Recovered, 46 cases; died, 25; total, 71. Mortality, 35.21 per cent.

Traumatic, Secondary. — Recovered, 5 cases; died, 3; total, 8. Mortality, 37 per cent.

Pathological. — Recovered, 63 cases; died, 8; total, 71. Mortality, 17.55 per cent.

Diseases for which amputation was done: elephantiasis, painful stump, enchondroma, ununited fracture, cicatricial contraction, ulcer of the leg, carcinoma of leg, gangrene, diseases of hip, osteomyelitis, sarcoma of tibia, sarcoma of femur, tubercular knee.

AMPUTATIONS AT THE HIP-JOINT.

Tuberculosis, 2 cases (1 recovered, 1 died); myxoma, 1; osteomalacia, 1; traumatic, primary, 2 (died). Total hip amputation 6 (3 recovered, 3 died).

SUMMARY OF THIRD PERIOD.

Shoulder-Joint	22 cases.
Upper Arm	83 "
Forearm	89 "
Leg	315 "
Knee-Joint	5 "
Thigh	150 "
Hip	6 "

Grand total, 670 cases.

MORTALITY PERCENTAGES FOR THE THIRD PERIOD, 1885-1896.

1. Amputation of the Shoulder-Joint.	
Traumatic, primary	31.57
Pathological	...
2. Amputation of the Arm.	
Traumatic, primary	22.22
Traumatic, secondary	18.18
Pathological	11.11
3. Amputation of the Forearm.	
Traumatic, primary	6.00
Traumatic, secondary	0.00
Pathological	8.57
4. Amputation of the Thigh.	
Traumatic, primary	35.21
Traumatic, secondary	37.00
Pathological	17.55
5. Amputation at the Knee-Joint.	
Traumatic, primary	50.00
Pathological	0.00
6. Amputation of the Leg.	
Traumatic, primary	13.66
Traumatic, secondary	7.14
Pathological	13.55

(1) The period from the founding of the hospital to 1870, represents the amputations done before antiseptics were generally used.

(2) The period from 1870 to 1890 represents the operations done while antiseptics were being introduced and had become established.

(3) The period from 1885 to 1896 represents the true antiseptic and aseptic period. The total amputations from the opening of the hospital cannot be estimated, for periods 2 and 3 overlap.

A glance at the following table, comparing the first and third periods, is very instructive. For some reason traumatic primary amputations of the arm present a higher mortality in the later period than in the first period. This is true of pathological amputations of the leg.

TABLE COMPARING MORTALITY PERCENTAGES OF MAJOR AMPUTATIONS DONE AT THE MASSACHUSETTS GENERAL HOSPITAL.

	1821-1870	1870-1890	1885-1896
1. Amputation at the Shoulder-Joint.			
Traumatic, primary	53.33	50.00	31.57
Pathological	27.27	00.00	00.00
2. Amputation of the Arm.			
Traumatic, primary	19.44	12.19	22.22
Traumatic, secondary . . . . .	....	....	18.18
Pathological	12.50	16.12	11.11
3. Amputation of the Forearm.			
Traumatic, primary	24.13	22.99	6.00
Traumatic, secondary . . . . .	....	....	0.00
Pathological	14.81	14.00	8.57
4. Amputation of the Thigh.			
Traumatic, primary	42.37	47.54	35.21
Traumatic, secondary	60.00	28.50	37.00
Pathological	20.98	23.28	17.55
5. Amputation at the Knee-Joint.			
Traumatic, primary	60.00	60.00	50.00
Pathological	36.36	50.00	00.00
6. Amputation of the Leg.			
Traumatic, primary	34.37	27.73	13.66
Traumatic, secondary	36.41	21.43	7.14
Pathological	12.60	13.78	13.55

All other amputations show a noticeable diminution in the mortality percentage.

The factors contributing to the diminution in the mortality-rate are probably several: the strict adherence to antiseptic and aseptic surgical principles in operating; perfection in the technique of operating; an intelligent care of the patient from the time of the receipt of the injury; the absence of primary hemorrhage; the greater care in the first dressing exercised by the general practitioner who sees and sends many of these hospital cases to the hospital. All these factors play an important causative part when considered collectively in diminishing the mortality following major amputation.

CÆSAREAN SECTION VS. SYMPHYSEOTOMY.

BY G. H. WASHBURN, M.D.

It is interesting to take a glance at the history of these two operations, and note the improved results with the progress of aseptic surgery.

Cæsarean section was first done anciently, by the Romans, on the dead mother to save the child. It was not till 1500 that the operation is known to have been performed on the living subject. Then it was done by a German sow gelder on his wife. She had been in labor four days and was attended, we are told, by thirteen midwives and several lithotomists. No progress being made, the husband, after conference with his wife, went to the town fathers to secure their permission to operate. It was granted, and having sharpened the carving knife he invited the timid to withdraw.

¹ Read before the Obstetrical Section of the Suffolk District Medical Society, March 23, 1898.

Most of the midwives retired. He then split open his spouse and delivered the baby. We are not told the subsequent treatment, but both mother and child recovered. This happy result, however, does not seem to have encouraged others, for it was thirty years or more before we have any record of a second.

The practice at first was to leave the uterus without any suture. As a result, deaths from hemorrhage were frequent, as well as deaths from sepsis.

The first real advance in operating was made by Porro, in 1876. He removed this source of danger by amputating the uterus and leaving the stump in the abdominal wound. The convalescence was very tedious, but there was no hemorrhage and less danger of sepsis.

It remained for Sænger, of Leipsic, in 1882, to inaugurate the method, which in its perfected form is used to-day. By this method there is no mutilation of the patient, there is no protracted convalescence, there is much less shock from the operation itself, and the mortality of mothers and children is now reduced to a very small percentage.

The first symphyseotomy on the living subject was done about a hundred and twenty years ago. Naples and Paris, Ferrara and Sigault, both claim the honor. Sigault's patient and child both lived, but the mother suffered for years from a vesico-vaginal fistula. Four succeeding operations were not as satisfactory in results, all the children and one mother dying.

From 1777 to 1800 the operation was done 34 times, nineteen of these being in France. The mortality, however, was so very great that the operation was abandoned. Its revival is due to Morisani, in Naples, in 1879. His limit of size of pelvis is two and five-eighths inches obstetrical conjugate. Below that, Cæsarean section. The operation is to be done at full term after labor has begun and dilatation well advanced.

The general statistics of the operation in the past ten years show a mortality of 14 per cent. of mothers and about 26 per cent. of children. If, however, we should accept Morisani's figures for his latter operations, we should have only 3.5 per cent. of maternal and 5.5 per cent. child mortality.

The dangers of symphyseotomy are hemorrhage; tears of urethra, bladder or vagina; septic infection; inflammation of joint; or failure of union. The danger in a Cæsarean section is from sepsis (and that is very small), and possibility of ventral hernia.

Statistics show a much smaller mortality for Cæsarean section, for both mother and child, than in symphyseotomy, barring the latest statistics of Morisani; and I presume that selected results in some one man's practice would be even better for Cæsarean section.

The difficulty of performing the operation is to be considered.

In Cæsarean section there are only soft parts to go through, all parts that are cut are exposed to view and any hemorrhage is easy to control. The operation is quickly finished. Few instruments are needed.

In symphyseotomy much of the cut part is out of sight. After the joint is severed, and the full three inches of separation of bone secured, you have still a difficult task before you to deliver the baby. Obstetrical forceps are usually needed, and serious tears of the soft parts are likely to result. The tissues severed are some of them those that are slow to unite. Convalescence is slow and tedious, the patient being obliged to lie in a sort of trough arrangement to insure constant approximation of the two parts of the symphysis.