and the ligament of Winslow freely incised longitudinally over either condyle of the femur.

In making the external incision care must be taken to avoid the external popliteal nerve which should be drawn inwards with the gastrocnemius. In cases where suppuration is prolonged difficulty may be experienced in keeping open the posterior incisions, but in these cases good drainage can be obtained by making a communication (c) between the posterior pouches in front of the ligament of Winslow and behind the crucial ligament and passing a small tube through from one posterior incision to the other.

Diagrammatic section to illustrate author's method of drainage of knee-joint. A, incisions into lateral pouches; B, incisions into posterior pouches; C, incision to establish free communication between posterior pouches. Bones: P, patella; EC, IC, condyles of femur. Muscles: B, biceps; Gs, gastrocnemius; SM, semi-membranous; ST, semitendinosus; G, gracilis; S, sartorius; V, popliteal vessels. The nerves are shown but not lettered.

The limb should be fixed on a splint in a slightly flexed position. Mr. Hey Groves's femur splint or the Balkan splint is the most satisfactory, as they allow slight extension to be applied, which adds to the comfort of the patient and delays erosion of cartilage. Moreover, the wound can be dressed without disturbing the limb.

Irrigation with salt solution, weak iodine, or other mild antiseptic should be carried out in the early stages, and if there is much inflammation hot fomentations are beneficial. I usually employ lint soaked in liq. sodæ chlorinatæ (1 in 40). The drainage-tubes should be removed as early as possible, and gentle passive movements commenced as soon as active mischief has ceased. Great care must be taken to prevent the tibia falling back on the femur while the wounds are healing and the ligaments still soft.

Results.

In all five cases of infection of the knee-joint due to the gunshot or shell wounds which have come under my care the time for practising excision of the tissues surrounding the wound and suture of the synovial membrane had passed.

One case had been suffering from suppuration in the joint for four or five weeks, accompanied by severe constitutional symptoms. I drained the joint by the method described above, but as no improvement resulted in general condition, the leg was amputated a few days later. The cartilage was found eroded in places, but there was no collection of pus in any part of the joint. I regret he died from pyæmia, but had his knee been freely drained at an early date, it is my belief that both limb and life would have been saved.

A young Australian, from the lower end of whose femur a shrapnel bullet had been removed and the synovial membrane sutured after excision of the infected tissues, arrived from the Peninsula at the Bombay Presidency Hospital with severe constitutional symptoms and his knee-joint inflamed and distended with pus. The knee was drained through anterior and posterior incisions, and though he went through a mild attack of tetanus, which delayed progress, he recovered with a joint possessed of fair and an increasing amount of movement.

Two other cases from the Peninsula were treated by continuous hypertonic saline irrigation, but as they both appeared to be losing ground I established free drainage five or six days later with satisfactory results.

Another case was under the care of one of my colleagues who, after removing all foreign material and grossly infected tissue, tried continuous irrigation with hypertonic, followed by normal saline solution. The local condition gradually got worse, and after three weeks suppuration appeared in the tissues at the back of the thigh necessitating an incision. A week later I was asked to operate, and found that one of the posterior pouches had ruptured, causing suppuration

amongst the muscles, and the other, when incised, discharged about a drachm of pus. His condition steadily improved, until he was transferred on the departure of the Bombay Presidency Hospital.

In conclusion, I wish to emphasise the necessity for free drainage of the posterior pouches. If this is done at a reasonably early stage the large majority of cases will recover with a useful limb and many with a fair range of movement. Complete ankylosis will by no means necessarily follow. I am convinced that too extended a trial of milder methods of treatment has led to the loss of many limbs and lives which might have been saved had free drainage been established earlier. Moreover, free incisions into the posterior pouches will do all that can be hoped for from freely opening up the joint by cutting through the ligamentum patellæ and other ligaments and will leave an infinitely more useful limb.

A NEW PHYSICAL SIGN IN PNEUMOTHORAX AND IN PLEURAL EFFUSION.

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THE sign dealt with in this paper and which, so far as I am aware, has not been previously described, I have found to be present, as far as appears from the number of cases examined, in the great majority of instances of pleural effusion, and it seems to occur in an even greater proportion of patients afflicted with pneumothorax. In fact so frequently have I observed the phenomenon that I consider that it may quite probably be found to be a valuable confirmatory sign of one or other of these conditions, more especially of pneumothorax.

Nature and Explanation of the Sign.

Briefly, the observation consists in the fact of the existence in these cases of a markedly diminished blood pressure in the leg as compared with that in the arm on the same side, a difference usually of at least 10 mm., and in many cases of over 20 mm.

In normal persons the systolic arterial blood pressures taken simultaneously with due precautions in the arm and leg of the same side (the armlet round both limbs being at the same level) will be found to yield practically identical readings. On the other hand, in certain pathological states differences have been found, the leg reading being higher than that taken in the arm. Thus I have observed differences of this kind in high-pressure cases associated with arterio-sclerosis,¹ and Leonard Hill has noticed them as a constant phenomenon in cases of aortic incompetence.² Differences in the opposite direction (in which the arm reading is higher than the leg one) doubtless exist under conditions in which there is obstruction to the circulation in the lower extremities, but so far, except in the class of case with which this paper is concerned, I have found only two definite instances: one in a girl aged 15 years, suffering with advanced pulmonary tuberculosis, in whom the leg reading was lower than the arm one by from 12 to 13 mm., the other in a male infant aged 2½ years (diagnosis uncertain), in whom a similar difference varying between 15 and 20 mm. existed. In neither of these cases was there an opportunity of making a post-mortem examination, so that the explanation of the phenomenon in them remains in doubt.

In regard to the explanation of the sign dealt with in this paper it will be remembered that anatomically the pleura on each side, more especially on the left, comes into relation with the descending thoracic aorta as it lies on the vertebral column, and I would suggest the most obvious cause to be that when the pleural cavity is distended with liquid or with gas pressure upon the aorta takes place, such pressure causing to a greater or lesser degree corresponding diminution in systolic pressure distally to the compressed

¹ O. K. Williamson: Clinical Observations on the Influence of the Vessel Wall on (so-called) Arterial Blood-Pressure Readings, *Proc. Roy. Soc. Med.*, May, 1909.

² Leonard Hill: The Measurement of the Systolic Blood Pressure in Man, *"Heart,"* vol. i., No. 1.

area. This explanation would be the same as applies in some cases of diminution of the sphygmometer reading in one upper extremity as the result of pressure by the sac of an aneurysm.

In one or two young children with pleural effusion whom I have examined for the sign I have not found it to be present to a marked degree. Perhaps this may be explained by the fact that the chest walls are less rigid in these than in older subjects. Thus, an intrathoracic pressure which in the case of the adult would exercise compression upon the aorta would in the young child be partly dissipated by the yielding chest walls, and would therefore fail to interfere to the same degree with the aortic blood pressure. Accordingly these cases in young children are not included in my series. Further, I have not included effusions in which there are higher leg readings resulting from thickened arteries or aortic incompetence.

The method of observation has been as follows :—

The patient has been at rest in bed, so that the armlet used for the leg reading and that for the arm have both been at the level of the heart. The Riva Rocci type of instrument was used, an Oliver's armlet of width 12 cm. being placed round the upper arm, and another one round the calf of the same side. Both armlets were connected by means of a three-way tube with the same pump and manometer. One observer took the systolic reading in the radial artery, the other in the dorsalis pedis or posterior tibial, and for alternate observations the two observers changed about so that the one who had previously taken the arm reading now took the foot one, and *vice versa*, the object of this procedure being to eliminate any personal equation. The readings taken were those obtained on letting the air out of the armlets after inflating them to a degree greater than necessary to obliterate the pulse in both limbs. The results are recorded in mm. of mercury.

Results of Observations.

These results show distinct differences in five out of the six cases of pneumothorax, and in five out of the seven cases of pleural effusion. In the former the differences are considerable, the average works out at exactly $16\frac{1}{2}$ mm., and in three of these cases the figure reaches a height ranging from 23 to 27 mm. In the cases of pleural effusion the average difference works out at $12\frac{1}{2}$ mm., and in one it actually reaches a figure of 35 mm. The details of the cases examined are as follows. Corresponding observations (on right or left side, as the case may be) on the same line were made simultaneously.

No. 1. Male, aged 28 years. Left hydro-pneumothorax. Bell sound, succussion splash, heart displaced.

Feb. 12th, 1913.			Feb. 19th, 1913.		
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
122 mm.	104 mm.	18 mm.	122 mm.	114 mm.	8 mm.
120 mm.	118 mm.	2 mm.	112 mm.	116 mm.	-4 mm.
122 mm.	100 mm.	22 mm.	112 mm.	110 mm.	2 mm.
124 mm.	112 mm.	12 mm.			

No. 2. Male, aged 24 years. Left pyo-pneumothorax, pulmonary tuberculosis. Succussion splash, heart displaced.

Dec. 1st, 1915.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
122 mm.	90 mm.	32 mm.	112 mm.	100 mm.	12 mm.
114 mm.	84 mm.	30 mm.	124 mm.	104 mm.	20 mm.

No. 3. Male, aged 19 years. Artificial pneumothorax (right), pulmonary tuberculosis.

Dec. 22nd, 1915.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
134 mm.	136 mm.	- 2 mm.	134 mm.	172 mm.	- 38 mm.
140 mm.	130 mm.	10 mm.	156 mm.	144 mm.	12 mm.

No. 4. Male, aged 34 years. Artificial pneumothorax (left), pulmonary tuberculosis.

Feb. 2nd, 1916.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
108 mm.	circa 85 mm.	23 mm.	98 mm.	83 mm.	15 mm.

No. 5. Female, aged 17 years. Artificial pneumothorax (right), pulmonary tuberculosis.

Nov. 8th, 1916.					
Left arm.	Left leg.	Difference.	Left arm.	Left leg.	Difference.
112 mm.	circa 60mm.	52 mm.	113 mm.	92 mm.	21 mm.
110 mm.	115 mm.	- 5 mm.	112 mm.	80 mm.	32 mm.
112 mm.	60 mm.	52 mm.	118 mm.	103 mm.	15 mm.

No. 6. Female, aged 20 years. Left pneumothorax, pulmonary tuberculosis. Marked signs of pneumothorax, heart displaced.

Feb. 13th, 1917.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
115 mm.	85 mm.	30 mm.	112 mm.	98 mm.	14 mm.
112 mm.	<i>circa</i> 60 mm.	52 mm.	110 mm.	95 mm.	15 mm.
112 mm.	83 mm.	29 mm.	115 mm.	100 mm.	15 mm.
110 mm.	100 mm.	10 mm.	114 mm.	70 mm.	44 mm.
112 mm.	85 mm.	27 mm.			

112 mm.	88 mm.	24 mm.	Feb. 27th, 1917.		
Right arm.	Right leg.	Difference.	Right arm.	Right leg.	Difference.
120 mm.	90 mm.	30 mm.	120 mm.	95 mm.	25 mm.
120 mm.	86 mm.	34 mm.	115 mm.	83 mm.	32 mm.

No. 7. Male, aged 16 years. Right pleural effusion.

June 10th, 1912.			June 17th, 1912.		
Left arm.	Left leg.	Difference.	Right arm.	Right leg.	Difference.
135 mm.	110 mm.	25 mm.	138 mm.	100 mm.	38 mm.
130 mm.	90 mm.	40 mm.	132 mm.	100 mm.	32 mm.
128 mm.	83 mm.	45 mm.	128 mm.	90 mm.	38 mm.
130 mm.	83 mm.	47 mm.	132 mm.	120 mm.	12 mm.

No. 8. Male, aged 12 years. Left pleural effusion. Signs very slightly marked.

Feb. 2nd, 1916.					
Right arm.	Right leg.	Difference.	Right arm.	Right leg.	Difference.
95 mm.	98 mm.	-3 mm.	97 mm.	98 mm.	-1 mm.

No. 9. Female, aged 50 years. Left pleural effusion. Signs slightly marked.

March 31st, 1916.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
114 mm.	97 mm.	17 mm.	109 mm.	103 mm.	6 mm.
121 mm.	97 mm.	24 mm.	107 mm.	106 mm.	1 mm.

No. 10. Female, aged 31 years. Left pleural effusion. Signs of effusion marked, heart displaced.

August 30th, 1916.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
123 mm.	121 mm.	2 mm.	115 mm.	115 mm.	Nil.
144 mm.	115 mm.	29 mm.	124 mm.	123 mm.	1 mm.
130 mm.	115 mm.	15 mm.			
140 mm.	115 mm.	25 mm.			

No. 11. Male, aged 15 years. Pleural effusion. Signs slightly marked.

Sept. 6th, 1916.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
132 mm.	128 mm.	4 mm.	130 mm.	134 mm.	-4 mm.
127 mm.	105 mm.	22 mm.	127 mm.	119 mm.	8 mm.
128 mm.	127 mm.	1 mm.			
128 mm.	119 mm.	9 mm.			

No. 12. Male, aged 17 years. Left pleural effusion. Signs of effusion marked, heart displaced.

Oct. 20th, 1916.					
Left arm.	Left leg.	Difference.	Left arm.	Left leg.	Difference.
105 mm.	92 mm.	13 mm.	105 mm.	90 mm.	15 mm.
111 mm.	90 mm.	21 mm.	111 mm.	93 mm.	18 mm.

On Oct 23rd 35 ounces of fluid removed from left pleural cavity.

No. 13. Male aged 15 years. Left pleural effusion. Signs of effusion marked; heart displaced.

Oct. 25th, 1916.					
Right arm.	Right leg.	Difference.	Left arm.	Left leg.	Difference.
104 mm.	92 mm.	12 mm.	87 mm.	60 mm.	27 mm.
100 mm.	85 mm.	15 mm.	98 mm.	80 mm.	18 mm.
95 mm.	85 mm.	10 mm.	92 mm.	93 mm.	-1 mm.
100 mm.	92 mm.	8 mm.	92 mm.	92 mm.	Nil.
			95 mm.	95 mm.	Nil.

On Oct. 26th 2½ pints of fluid removed from left pleural cavity.

I have to thank my colleagues for allowing me to examine cases under their care ; also Dr. C. D. S. Agassiz, Dr. C. G. Whorlow, Dr. I. Bastow, Dr. H. Davies, Dr. J. R. Earp, Dr. A. E. Parker, Mr. Carpenter, and Mr. Unwin for kindly assisting me in carrying out the observations.

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SUSCEPTIBILITY TO CEREBRO-SPINAL FEVER IN RELATION TO AGE.

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IN continuation of our studies into the etiology of cerebrospinal fever we have been led to investigate the most susceptible age for the appearance of the disease. Theoretically, as will be seen presently, the question is of considerable interest in its bearing on etiology. Practically, it is also of importance, in view of the fact that many diseases are to-day recognised as showing age incidence, the latter often playing a prominent part for the clinician in the differential diagnosis of numerous conditions.

For the purpose of the present study we have taken data, collected by ourselves, arising out of the epidemics of 1914-15 and of 1915-16 in the Dorset Military District.

With regard to the epidemic of 1914-15, of 31 cases (civil and military) of the disease, about whom accurate information as to age is available, the age-distribution is as follows :—

Age.	Cases %	Age.	Cases %
5 to 10 years.	3·22	30 to 35 years.	9·63
10 „ 15 „ 4·84		35 „ 40 „ 6·45	
15 „ 20 „ 22·58		40 „ 45 „ 1·61	
20 „ 25 „ 37·10		45 „ 50 „ 4·84	
25 „ 30 „ 6·45		Over 50 „ 3·23	

On plotting the percentage of cases as ordinates, and the corresponding age-periods as abscissæ, these numbers give the graphical representation of Fig. 1. This figure shows