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HYDATID DISEASE OF THE LUNGS.

BY
LEEDS & WEST-RIDING
MEDICO-CHIRURGICAL SOCIETY

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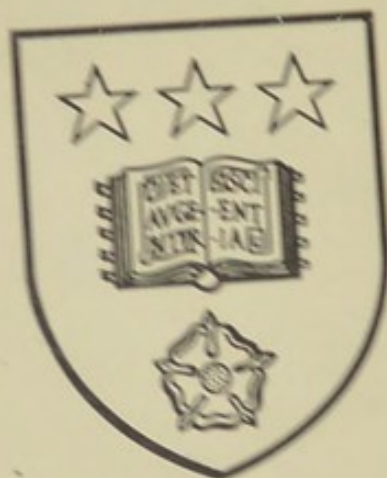
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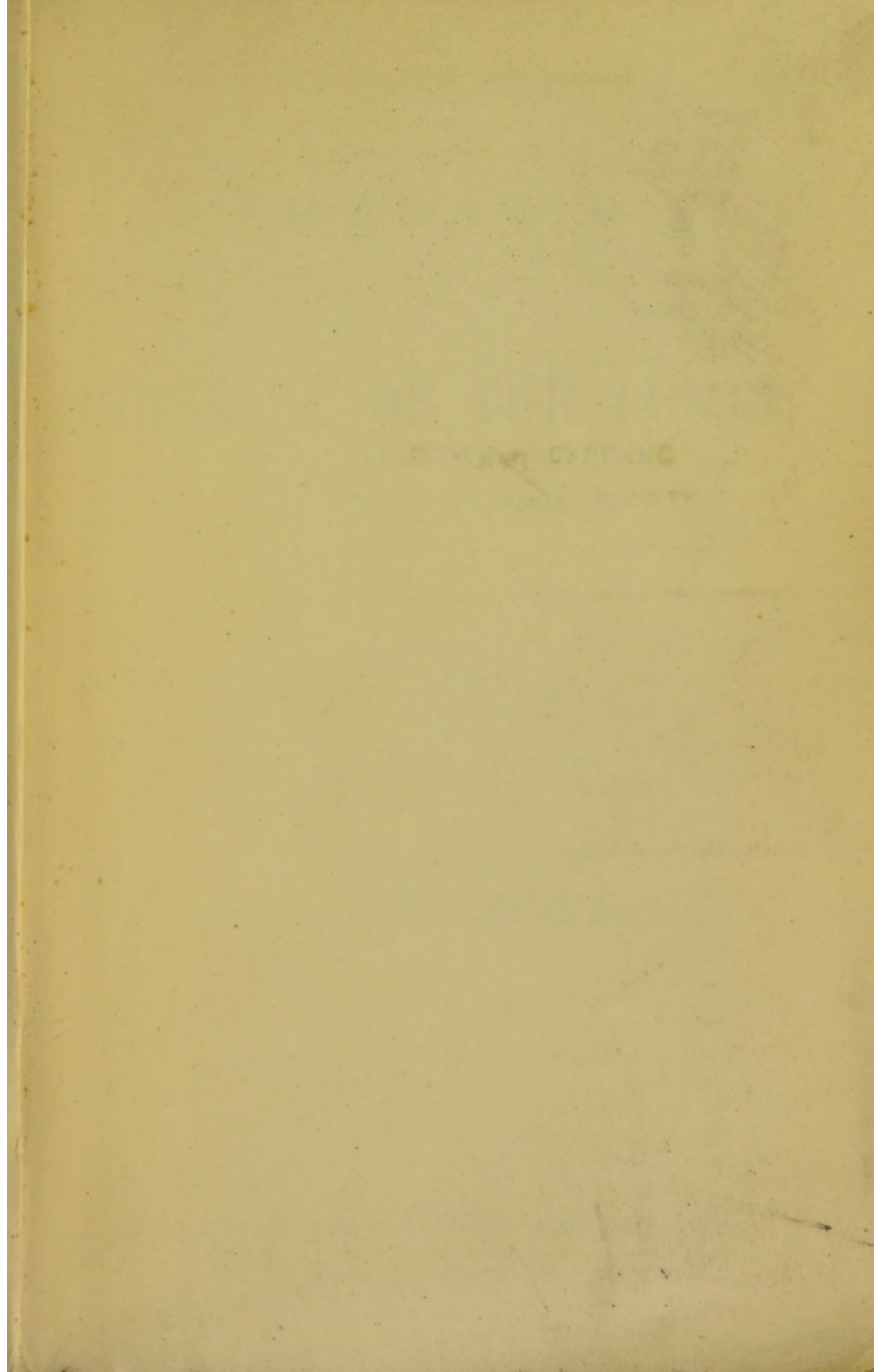
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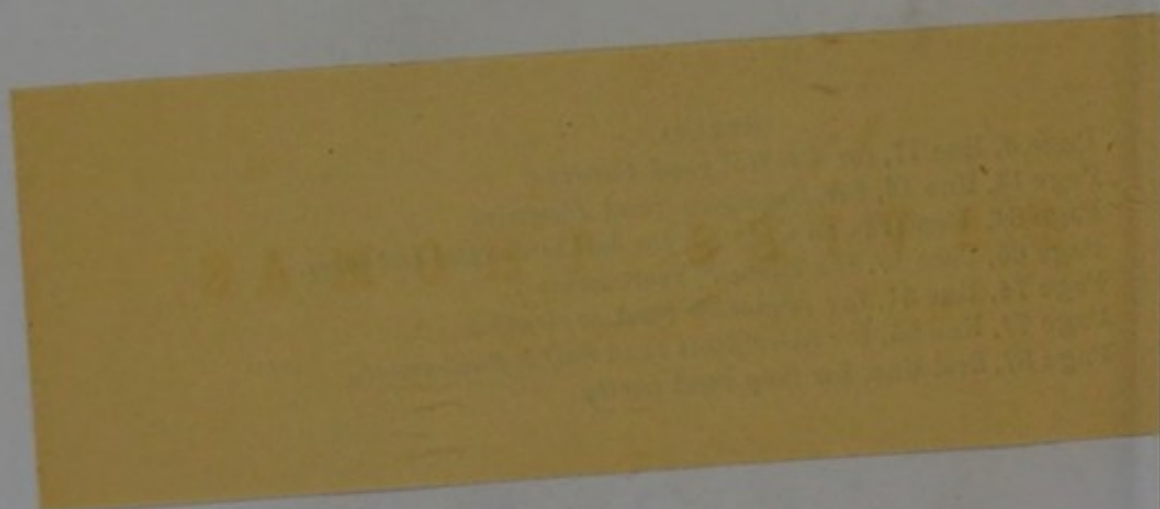


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ERRATA.

- Page 8, line 17, for *Cardial* read *Cardiac*.
Page 14, line 13, for *Dyspepsia* read *Dyspnœa*.
Page 64, Remarks on Case 14, for *bad sores* read *bed-sores*.
Page 65, Case 17, for *Louis F.* read *Louis T.*
Page 74, line 31, for *expiation* read *expiration*.
Page 77, line 25, for *three pints* read *half a fluid-ounce*.
Page 87, first line, for *lung* read *cavity*.



H Y D A T I D

DISEASE OF THE LUNGS.

LEEDS & WEST-RIDING

MEDICO-CHIRURGICAL SOCIETY

BY

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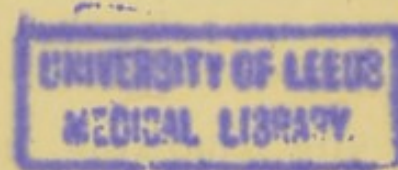
THE DISEASE OF THE LUNGS

LEEDS & WEST RIDING

AND CHURCHILL SOCIETY

J. DAVIES THOMAS

AND LONDON



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HYDATID DISEASE OF THE LUNGS.

Cases of intra-thoracic hydatid naturally resolve themselves into two great groups *i.e.*:—

1st. Those in which the parasite occupies some organ or structure within the chest as its primary seat.

2nd. Those in which hydatid cysts, primarily situated in the cavity, or in one of the organs of the abdomen, or in some other region outside the thoracic cavity, rupture into the thorax.

For the present we are concerned only with certain cases belonging to the first-named class, which includes hydatids of the lungs, pleuræ, mediastina, heart and great vessels, and those of the pericardium.

The present paper is confined to the consideration of hydatids of the lungs and pleuræ only.

As regards the frequency of cases of intra-thoracic hydatid ; this varies, as we can readily suppose, in accordance with the prevalence of Echinococcus disease in any given country.

Of all known countries, Iceland and Australia are those most severely affected by this disease, and here we may naturally look for the greatest proportionate number of cases of intra-thoracic hydatid.

According to statistics tabulated and published by myself, and based upon nearly 2,000 cases of Echinococcus disease collected from various parts of the world, it appears that the organs of the cavity of the thorax are attacked in the proportion of nearly 15 per cent. of the total number of cases, and that in about 11·5 per cent. the lungs are the seats of the parasite.

In fact, the lungs are, next to the liver, the most frequent seat of hydatid disease in man.

There is reason to suspect that in the domestic Herbivora the lungs are in this way diseased, relatively, more frequently than is the case with man. I have not at present data sufficient to justify a positive assertion

upon this point as regards Australia, but in India it seems certain that this really is the case, for in a report supplied by Dr. Cleghorn, it was stated that over 42 per cent. of the animals slaughtered at Mooltan for commissariat purposes were affected with *Echinococcus* disease. "In the majority of cases both the lungs and liver were affected, cysts were found 829 times in the liver, and 726 times in the lungs."* Apparently in man the ratio of lung to liver hydatids is—for Europe, one to six-and-a-half; for Australia, one to four.

This is a very interesting point in Comparative Pathology. It seems to me that the explanation may be found in one or both of the following facts :—

1st. The lower animals when infected with *Echinococcus* disease have the disease more frequently in the form of multiple cysts than man has. This is, no doubt, due to the fact that they repeatedly drink the same infected water, and so absorb many doses of eggs of *echinococcus*, and of course the greater the number of eggs swallowed by the host the greater are the chances of the lungs receiving a share of them.

2nd. In the lower animals, the variety of *Echinococcus* most frequently found is *Echinococcus scolicipariens*, whilst in man, the most usual form is *Echinococcus altricariens*. It is possible that this may have a bearing upon the distribution of the parasites in the body of the host.

It has been suggested by my friend, Dr. Dougan Bird, of Melbourne, that cases of lung hydatid, as compared with those in the liver, are more numerous in Victoria than in Europe.

This point is discussed by me in my work on Hydatid disease,† and I have advanced reasons for doubting whether the difference is real or only apparent.

The remarks upon hydatid disease of the lungs, which I shall have the honour of addressing to you this evening, are based upon the study of 264 cases, twenty-seven of which have come under my own personal observation.

I have thought that for the purpose of originating a discussion upon this subject it would be better to utilise all the data at my disposal, rather than to communicate my far more limited personal experience.

In this way it will be more clearly seen where our present knowledge requires addition and our opinions need modification.

SEX.—In 15 cases the sex of the sufferer was not mentioned, but of the remaining 249 cases there were—

Males	152	=	61·04 per cent.
Females... ..	97	=	38·95 "
	<hr/> 249		<hr/> 99·99

* Cobbold Parasites, p. 124.

† Hydatid disease; with special reference to its prevalence in Australia. Adelaide: E. Spiller, Government Printer. Page 122.

AGE.—In 209 cases only was this recorded :—

Age.	No. of Cases.	Per Cent.
1 to 10 years old	13	6.220
11 " 20 " "	40	19.138
21 " 30 " "	53	25.358
31 " 40 " "	49	23.445
41 " 50 " "	34	16.268
51 " 60 " "	15	7.177
61 " 70 " "	4	1.913
Over 70 years of age	1	0.478
	209	99.997

SIDE OF CHEST INVADED.—When only one cyst was present in the chest, as happened in 216 cases, it was found—

In the Right lung in	103 cases
In the Left lung in	53 "
Side not mentioned in	60 "

216

The disproportion between the number of instances in which the right and left lung were attacked is very marked, and it becomes still more curious, when we learn that it is especially the lowest parts of the lungs that exhibit the disproportion to the highest degree. This will be seen by referring to the subjoined table :

Lung.	Upper Part.	Middle.	Lower Part.	Entire Lung or no exact statement of part invaded.	Total.
Right...	14	8	44	37	103
Left ...	14	1	23	15	53
	28	9	67	52	156

In 52 cases the exact locality of the lung in which the parasite took its origin is not mentioned, but in many of these cases practically the whole of the lung was occupied by the cyst.

The very marked preference for the right lung shown by Echinococcus resembles that of croupous pneumonia for the same lung.

In a considerable proportion of cases more than one mother-cyst is found in the human "host," and sometimes instances occur in which the multiple cysts are found only in the lungs or pleuræ. Among 19 such cases their distribution was—

One or more in Both lungs ...	...	...	...	16 cases
" " " the Right lung ...	...	...	...	2 "
" " " " Left " ...	...	...	...	1 case.

So that including single and multiple cysts of the lungs there were—

In the Right lung	...	...	105	=	60.00 per cent.
In the Left lung	...	...	54	=	30.85 "
In Both lungs	...	...	16	=	9.14 "
			—		—
			175	=	99.99

It is interesting to compare this with the liability to pneumonia of each lung respectively, and also of both lungs together.

The percentages for pneumonia are derived from the statistics of that disease prepared by Juergensen, and based upon 6666 cases treated in the hospitals of Vienna :—

		Right Lung.	Left Lung.	Both Lungs.
Pneumonia	...	53.7	38.23	8.07
Echinococcus	...	60.00	30.85	9.14

At present no plausible explanation of the far greater liability of the right lung to these diseases can be offered. Of course the right lung is notably larger than the left one, but only in the weight-ratio of about 42 to 40.

With regard to Echinococcus, the fact, that it is especially the middle and lower parts of the right lung that show the disproportion, leads to a natural suspicion that hydatids arising from the upper part of the liver and projecting into the lower part of the right chest have been in some instances mistaken for genuine lung hydatids. But a careful enquiry into the cases in which a post mortem examination was made, proves that there is a genuine predisposition to invasion of the lower lobe of the right lung, in fully as high a ratio as that just mentioned.

Multiple cysts, when present, may arise in three different modes.

1st. The patient may have swallowed more than one ripe egg of *Tænia echinococcus*. In some cases where hundreds of separate isolated (mother) cysts have been found in the body, possibly an entire ripe proglottis, containing hundreds of eggs, may have been taken into the stomach; in this case it is likely that the cysts will be scattered over a great part of the body of the luckless "host."

2nd. Multiple cysts may arise by exogenous development from a single primary cyst. Then the resulting cysts will be near each other, perhaps enclosed in a common fibrous capsule. This is a common occurrence in the domestic Herbivora, and is sometimes met with in man; but then it is usual for the group of cysts to be enclosed in a single common capsule.

3rd. As regards the pulmonary artery, both within and outside the lungs, it is certain that hydatids may rupture into the right cavities of the heart and give exit to some or all of their contained daughter cysts, which are then rapidly carried by the blood-current into the pulmonary artery and its branches. If they are not large enough to cause rapidly fatal obstruction to the circulation through the lungs, the transported parasites

will settle themselves down to a new lease of life, provided they have not burst in transit.

Instances of both living and collapsed hydatid emboli in the pulmonary artery will be recorded in a later part of this paper.

Amongst the cases that I have collected, the distribution of multiple cysts, as regards the lungs was—

Cysts in Both lungs	...	...	...	16 cases.
" " pleuræ	1 case.
Multiple cysts in Right pleura	1 "
" " " " lung	2 cases.
" " " Left lung	1 case.

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But when multiple cysts are present it is far more common for other organs to suffer with the lungs. I have met with 55 cases of this description, they are tabulated as follows :—

Lung and liver	...	...	...	...	24 cases.
" Liver and colon	...	...	...	...	1 case.
" " " peritoneal cavity	...	...	...	...	4 cases.
" " " brain	...	...	...	...	2 "
" " spleen and epiploon	...	...	...	...	1 case.
" " " " abdomen	...	...	...	...	2 cases.
" " and kidney	...	...	...	...	2 "
" " heart, spleen, kidney, and psoas and iliacus muscles	...	...	...	...	1 case.
" " and heart	...	...	...	...	1 "
" and spleen	...	...	...	...	1 "
" spleen and kidney	...	...	...	...	1 "
" " " heart	...	...	...	...	1 "
" and heart	...	...	...	...	6 cases.
" and abdomen	...	...	...	...	2 "
Pleura and liver	...	...	...	...	5 "
" lung and heart	...	...	...	...	1 case.

55

It will be noticed that in 43 out of the 55 cases the liver claimed a share.

The blood vessels of the lungs may harbour cysts or parts of cysts.

Of course it is almost certain that whenever a lung hydatid is met with, it took its origin from an embryo conveyed thither through the pulmonary artery, for it is infinitely more probable, upon anatomical grounds, that the embryo took the shorter and easier course to the lungs through the pulmonary artery, than the (to it) very round-about course through the bronchial arteries.

It would be an extremely unprofitable and futile task to discuss, as some writers have done, the exact element of the lung in which the resting embryo commences its new mode of existence, especially as the point is one of no practical significance.

But what is of far more interest and importance, is the occasional occurrence of hydatid cysts of considerable size in the interior of the blood vessels themselves, and they have been found both in the pulmonary artery and in the vein.

HYDATIDS IN THE INTERIOR OF THE PULMONARY ARTERY AND ITS BRANCHES.

They have been met with anywhere from the arterial orifice in the right ventricle to the more remote branches inside the lung.

For example—Broderibb* has recorded the case of a lady in whom the right ventricle was so largely occupied by an hydatid cyst, as to cause fatal interference with the passage of blood into the pulmonary artery. Death took place three hours after the onset of a sudden severe attack of dyspnoea and cardiac oppression.

In this case, however, the hydatid can scarcely be regarded as being *inside* the pulmonary artery. However, I have from various sources collected and tabulated eleven cases, where hydatids or parts of hydatids actually occupied the interior of this artery or its branches.

Five of these occurred in females, six in males. The youngest patient was a boy, aged 10 ; the eldest, a man, aged 47.

As the most important facts connected with these cases are recorded in the table, it will not be necessary for me to refer at length to them.

However, it is interesting to note that in eight out of the eleven cases, there were present hydatids on the right side of the heart.

In case No. 8 I have not been able as yet to peruse the original record, and the reference to the case in Virchow and Hirsch's *Jahresbericht* is a very brief one.

In case No. 9, no heart hydatid was found, although several cysts were found in the abdomen, one of which, a liver cyst, had ruptured into the pericardium.

Case No. 10 is an example of the rare multilocular variety of echinococcus.

In all the remaining cases there were hydatids in the right side of the heart. Once in the right auricle, six times connected with the right ventricle, and once connected with both right auricle and ventricle. In these cases it was either certain or highly probable, that either recently or more remotely the heart hydatid had ruptured or become detached, and that the hydatids found in the pulmonary artery were really embolic in their origin. This was plainly the case in No. 6.

In some instances the pulmonary circulation was so impeded by the

* *Lancet*, 1837-38, p. 625. Cited also by Davaine and Hearn.

HYDATID CYSTS IN THE PULMONARY ARTERY.

No.	Reference.	Sex.	Age.	Symptoms observed during life.	Locality of the Hydatids present.	Phenomena connected with death.
1	Griesinger. Archiv für Phys. Heilkund, 1846, cited by De Welling, Paris Thesis, 187, p. 18-19.	Female.	37	Feelings of anxiety and oppression in the chest. Half an hour later found dead in bed.	A hydatid situated in the intra-ventricular septum, ruptured into the right ventricle, and passed thence into the pulmonary artery. The cavity that contained the hydatid was of the size of a large walnut.	None observed.
2	Rokitansky. Cited by Davaine and De Welling.	Female.	23	None recorded.	Hydatid situated in the intra-ventricular septum. Rupture of the sac, with the escape of the hydatid into the right ventricle. The vesicle, which was of the size of a hen's egg, was forced by the blood current into the conus arteriosus, and as far in the pulmonary artery as to reach the left branch of this vessel. There were also three hydatid tumours in the liver.	Death sudden.
3	Budd. Path. Soc. Trans., 1859, vol. X., p. 80.	Female.	23	Formerly two attacks of pleurisy Cough, dyspnoea especially on exertion. Hæmoptysis at first streaky, and afterwards copious. (Edema of legs. Systolic murmur at the base of heart, which, however, gradually became less loud, and ultimately disappeared before death; slight albuminuria.	Hydatid tumour of the size of an orange, at apex of heart projecting into the right ventricle; several hydatids in trunk of pulmonary artery, and clusters of hydatids ruptured and unruptured, in branches of the left pulmonary artery, especially in upper lobe. None in right lung. The pulmonary artery hydatids as well as a ruptured one found under one of the laminae of the tricuspid valve had evidently escaped from the cyst at the apex of the right ventricle.	Death not abrupt.

HYDATID CYSTS IN THE PULMONARY ARTERY.—(CONTINUED).

No.	Reference.	Sex.	Age.	Symptoms observed during life.	Locality of the Hydatids present.	Phenomena connected with death.
4	Drs. Manson and Barclay. Lancet, 1864, vol. I., p. 225.	Male.	26	Hæmoptysis and obscure cardiac and pectoral symptoms, which puzzled his medical advisers.	In right ventricle of heart, near the tricuspid valve, a hydatid of the size of a walnut, and containing numerous daughter cysts was found. The pulmonary artery and its branches contained several minute hydatids. Both lungs, but especially the left one, studded with numerous hydatids of various sizes. One of the hydatids in the upper lobe of the left lung, had ruptured into the corresponding pleura, and had caused empyema.	
5	Kelly, Path. Soc. Trans., vol. XX., p. 145.	Male.	10	None present, except slight pain in his chest. "He could run about as well as other boys of his age, up to the time of his death."	Hydatid in the appendix of the right auricle. It contained many daughter cysts, the largest of the size of a walnut, had escaped and blocked up the auriculo-ventricular orifice, causing death. In a main branch of each pulmonary artery at the root of the lungs was an oval hydatid cyst. These cysts had evidently been there for some time, for they had formed adhesions with the coats of the artery, and had made dilated sacs for themselves. Moreover the proximal ends were smaller than their distal ones, and the branches of the pulmonary arteries beyond the obstruction had become narrowed.	Fell down suddenly, insensibly. No dyspnoea, but slight convulsions.

6	Stirling & Allen, Aust. Med. Jour., 1879, p. 394.	Male.	47	Cough, hæmoptysis, expectoration of pieces of membrane. General symptoms of phthisis. Capillary bronchitis and sudden death.	In substance of right ventricle of heart at its apex a hydatid, size of a large hen's egg, and full of small daughter cysts. Rupture in its inner wall, occluded by a pale adherent clot of some standing. Numerous hydatid cysts in both lungs, especially in the right. The cysts were mostly contained in dilations of the pulmonary arteries. "Some cysts, however, lay in distinct cavities of large size, one being one inch and three-quarters in diameter, lined by fibroid membrane, and one of these larger cavities in the lower lobe of the right lung opened into a bronchial tube." The spleen also contained a large, but partially degenerated cyst.	Death sudden.
7	Bingham Crowther. Aust. Med. Jour., 1880, p. 362.	Male.	—	Pain in chest, giddiness, and sickness, possibly due to smoking ("which he had not been accustomed to.") suddenly became insensible, gave several irregular gasps, and died in a few minutes.	Hydatid in septum ventriculorum, which had ruptured into the right ventricle, and had permitted the escape of six to eight cysts, varying in size from a pea to a filbert, into that cavity. "Near the origin of the second division of the right pulmonary artery a white collapsed hydatid cyst was found blocking up for two inches this portion of the artery, completely occluding the same."	—

HYDATID CYSTS IN THE PULMONARY ARTERY.—(CONTINUED).

No.	Reference.	Sex.	Age.	Symptoms observed during life.	Locality of the Hydatids present.	Phenomena connected with death.
8	Maschka. Pragen. Med. Wochenschrift, No. 5. Cited in Virchow & Hirsch's, Jahresbericht, vol. xv., part 1, p. 665.	Female.	—	Suspicion of poisoning in consequence of sudden death.	Two large echinococcus cysts at the left edge of the heart, one of which had ruptured into the pulmonary artery.	—
9	Wunderlich. Archiv. für physiolog. Heilkunde, 1858. Cited by Davaine and by Hearn.	Male.	22	Headache, giddiness, noises in the ears, abdominal pains, diarrhoea, epistaxis. Rigor, followed by heat and sweating. Slight albuminuria, &c.	In a branch of the third order, furnished by the right pulmonary artery, and corresponding to the lower lobe of the lung, there was a cylindrical dilatation of the size of a pigeon's egg, completely filled by a hydatid cyst. The branches of the artery beyond this point were filled with debris of hydatids, but the corresponding lung tissue was not altered. No hydatid found in the heart, but a hydatid of the left lobe of the liver had ruptured into the pericardium, and had caused violent pericarditis. There were several other hydatids in the abdominal cavity including one in the spleen.	—

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10	Schrötter. Medizin Jahrbü- cher. Wien, vol. xiv.	Male.	29	Cough. Repeated hemoptysis and ex- pectoration of cysts, pyrexia, emaciation, pain in the chest, phy- sical signs of consoli- dation, with small cavities in both lungs, elastic fibre in consi- derable amount found in the expectoration.	<p>Tubercles in the peritoneum. Two small ordinary hydatids in the liver, which also contained a small patch of the multilocular form. In both lungs similar and more extensive growths. In a branch of the first order of the pulmonary artery of each lung a hydatid vesicle enclosed in a sort of pouch of the artery. That on the right side was about the size of a nut, that on the left exceeded the size of a bean. In the smaller branches of the pulmonary arteries in both lungs, numerous smaller hydatids, ruptured and entire.</p>
11	Böcker. Zur Statistik der Echinococcen. Berlin, 1868, p. 14.	Male.	15	None recorded.	<p>The lumen of the right pulmonary artery contained a sac about the size of a bean, attached to its posterior wall. The artery of the left upper lobe was entirely closed by an echinococcus cyst. Numerous hydatid cysts connected with the heart, which was about the size of a child's head. Right auricle and ventricle dilated. Left renal artery blocked by an embolic echinococcus cyst.</p>

large size of the obstruction that sudden death occurred. In other cases the cysts were smaller or ruptured, and in some instances the unruptured cysts had formed pouches for themselves within the calibre of the blood vessels.

Of course it does not follow of necessity when hydatids are found simultaneously in the right side of the heart and in the lungs, that the latter are secondary to the former. For when a great number of hydatids are scattered all over the body, both the lungs and the heart may receive their shares quite independently of each other.

A very interesting case of this kind was recorded by Dr. Peacock and Mr. Wale Hicks.*

It occurred in a sailor boy, aged 18, admitted into St. Thomas Hospital, London, in 1864. He was suffering from cough, dyspepsia pain in the chest, and he expectorated much blood-stained purulent matter and small hydatid cysts. There were numerous hydatids in the liver, spleen, right kidney, and other parts of the abdomen. Both lungs contained numerous hydatid cysts, most of which were of about the size of a horse-chestnut or somewhat larger, embedded in cavities of the pulmonary tissue. There was a partially collapsed cyst, with thickened walls on the surface of the right ventricle of the heart, apparently partially embedded in the muscular structure, but not projecting into the cavity of the ventricle.

In this case it was evident that the lung and heart hydatids were quite independent of each other.

HYDATIDS IN THE PULMONARY VEIN.

† Andral has recorded an extraordinary case where numerous hydatid cysts of sizes varying from that of a large nut to that of a pea were found enclosed in dilatations of the pulmonary vein.

A man, aged 55 years, had suffered severely from the ordinary signs of heart disease. Habitual orthopnoea, œdema of the limbs, face puffed and dusky. Murmurs in the whole extent of the sternum and under the two clavicles. At several points of the thoracic walls moist bronchial râles were heard, whilst at others there was a complete absence of respiration. Respiration became more and more difficult, and the patient died in a state of asphyxia. Autopsy. The two lungs were found filled with a large number of hydatids, varying in size from that of a pea to that of a large walnut. At first sight they appeared to be lodged in the lung substance itself, but careful dissection proved that they were contained in dilatations of the pulmonary veins. They existed equally in both lungs, and were found both unruptured and ruptured; in the latter case they occupied elongated narrow channels, which were ramified like the ordinary vessels. Around the cysts, the lung tissue was in many places healthy and crepitant, in others, highly congested and even hepatised.

The right cavities of the heart were considerably dilated, and the walls of the right ventricle were somewhat hypertrophied.

In the liver was found an hydatid of the size of a large orange. It had cartilaginous walls, and contained eight or ten acephalocysts.

* Path Soc. Trans., vol. xv., p. 247.

† Clinique Médicale. Paris, 1840. Tome II., p. 392.

Evidently the dilatation of the right cavities of the heart, and the hypertrophy of the right ventricle were due to the impediment to the circulation through the pulmonary veins.

As far as I have been able to discover, this case is unique in the annals of medicine, and no explanation can be offered to account for the conveyance of the hydatids into the interior of the veins.

HYDATIDS IN THE BRONCHIAL TUBES.

It is scarcely possible that a cyst of any material size could long occupy the interior of one of the larger bronchial tubes ; for the presence of such a foreign body would cause such violent cough and dyspnœa as would probably soon lead to its expectoration.

Indeed it is very rare for the cystic phase of *Echinococcus* to occupy as its primary seat any tube lined by mucous membrane. But Mégnin* has recorded the case of a degenerated echinococcus cyst of the size of a hazel nut, which was found in the substance of the intestine (ileum) of a horse. It lay immediately under the mucous membrane, just above the ileo-cæcal valve. I have hitherto been unable to find on record any cases where in man, hydatid cysts occupied the larynx, trachea or bronchial tubes as their primary seats.

But Davaine† cites Reynaud as having seen, in several instances, lungs of the cow, deer, and gazelle, containing "acephalocysts" in the extremities of the bronchial tubes.

But cysts or portions of cysts may rupture into and be arrested temporarily or until the death of the patient, in the larger air passages, *e.g.*, the larynx or trachea.

Such impaction if of momentary duration, occasions intense dyspnœa, lividity of the face, &c., with sense of dying from suffocation.

If of more than very brief duration, the grave obstruction to respiration may without doubt cause death.

Schrötter‡ records a case in which there was found—

"In a bronchus of the first order of the left lung, a collapsed echinococcus vesicle, surrounded by detritus, and which would have been, when full, of about the size of a walnut."

Turner§ has recorded a case of a woman, 29 years of age, who had many hydatids in the peritoneal cavity, and a large one in the lung, into which many bronchial tubes opened. "In one bronchus a hydatid cyst was found."

In such cases it is probable that the hydatids found in the interior of the bronchial tubes had reached their location not long before the death of the patient.

* Virchow and Hirsch, Jahresbericht, xiv. Jahrgang, 1879. Part I. p. 355.

† Traité des entozoaires, deuxième édition. Paris, 1877, p. 352.

‡ Mediz. Jahrbücher. Wein, 1867, vol. xiv., fasc. 4, p. 31.

§ Bull. de Therap., 1848, p. 226.

In the instances just referred to, the hydatids were found in bronchial tubes belonging to the lung in which the original cyst was situated.

But it is even more curious and important to note, that occasionally pieces of hydatid membrane may be found in the bronchial tract of the lung, opposite to the seat of the hydatid from which they were derived.

Thus, in an interesting case lectured upon by Broadbent.*

The patient, a girl, aged 19, had a large hydatid cyst, which occupied the greater part of the right lung. This had ruptured, and caused the death of the patient. At the post mortem examination there was found the collapsed cyst in the right lung, and on the left side "a small hydatid membrane also was found impacted in the bronchus, carried thither, no doubt, by an inspiratory current of air."

This fact is worthy of particular notice, and will be referred to hereafter, in connection with the phenomena of rupture of pulmonary hydatids into the bronchial tract.

It is remarkable to observe how extensive a fragment of ruptured cyst or what large unruptured vesicles may pass safely through the glottis.

Thus, I have known a fragment of mother-cyst, fully as large as a crown piece, to pass through the glottis of a boy, aged 9 years, and a piece as large as the top of a tumbler has also been known to be safely expectorated in an adult.

Of course in such cases the dyspnoea is for a time very urgent.

Even after the cyst has passed through the glottis the danger of suffocation is not quite passed. For example, a case is recorded by Rudall† thus—

"One morning the patient was found by his wife on the floor, insensible, black in the face, and choking. She put her finger into his mouth and hooked up an hydatid cyst, and thus saved his life."

SYMPTOMS OF PULMONARY HYDATIDS.

In nearly all respects the symptoms of hydatid cysts of the lung, pleuræ and mediastinum are identical, but reference will hereafter be made to certain characters, by which it is alleged that cysts of the pleuræ may in some cases be distinguished during life from true pulmonary cysts.

The symptoms of cysts in these various localities vary from such slight and ill-defined phenomena as completely escape the notice of the patient and his physician, up to a condition the gravity of which cannot fail to claim the anxious attention of both.

If the growth be a small one there may be absolutely no symptoms.

Thus Andral‡ relates the case of a woman, aged about 45, who died of a uterine cancer. She had been under observation for the last two months of her life. "Her respiration was free, and there was no cough," yet at the post mortem examination she was found to have, towards the centre of the lower lobe of the right lung a hydatid of the size of a large walnut, containing daughter cysts.

* Lancet, October 26, 1878, p. 575.

† Aust. Med. Jour., 1877, p. 126.

‡ Clinique Medicale, quatrième édition, 1840, p. 390.

Occasionally hydatid cysts of the lung undergo spontaneous death and degeneration, and are discovered only after the death of the patient from other causes.

When symptoms are present, their severity will depend upon the size, and to some extent the situation of the growth, upon its condition as regards integrity or rupture, and upon the state of the adjacent lung tissue.

After the cyst has burst into a bronchial tube, there may either be only very slight constitutional disturbance, or a state may be induced similar to that present in the last stage of phthisis, but happily exhibiting a greater tendency towards recovery.

Rupture into various other situations produces symptoms which will be hereafter alluded to.

In general terms it may be stated, that the subjective symptoms and physical signs of pulmonary hydatids may be divided into two great classes, *i.e.* :—

1st. Those dependent upon the presence of the unbroken cyst.

2nd. Those caused by the ruptured cyst.

As has been already mentioned, if the cyst be small there may be no symptoms at all, or at any rate, none that attract the patient's attention, or induce him to consult a medical man.

Owing to the slow and latent growth of the *Echinococcus* cyst, it is common for a large area of the lung to be invaded without serious discomfort to the patient, and the earliest decided intimation of the presence of a lung hydatid is in many instances occasioned by its rupture into the bronchial tract or pleura.

When such a catastrophe has occurred, however, it is usually possible to discover upon enquiry, that the patient had for a longer or shorter time been subject to certain more or less slight and perhaps fugitive signs of chronic chest disease.

These consist principally of four chief symptoms.—Pain in the chest, dyspnoea, cough, and hæmoptysis, and it will be convenient, in order to prevent needless repetition, to consider briefly all these phenomena as they occur both in the unruptured and ruptured cyst stages.

COUGH.

More or less cough is almost invariably present, but it may be so slight and so absolutely unaccompanied by the usual symptoms of serious lung disease, that it may cause no concern to the patient, until increasing shortness of breath, hæmoptysis, loss of flesh and strength, or some other phenomenon arouses his attention.

At first the cough is usually short and dry, and it may continue so for a couple of years or longer.

In a small proportion of cases the cough has a severe paroxysmal character which has been compared to that of whooping cough.

An instance of such a case was recorded by Roger.* I have had under my care a young lady, aged 19, who, after what seemed to be a genuine attack of whooping cough, lost the whoop but continued to cough, and about four months after the cessation of the whoop ruptured a pulmonary hydatid, and coughed up the membrane.

I have not been able to discover any connection between the exact locality of the cyst in the lung and this paroxysmal kind of cough. It evidently must be connected with a peculiar kind of irritation of the branches of the pneumogastric nerve within the lung.

In some instances the cough has been accompanied by a more or less marked croupy "clang," and even the voice has become altered. This was remarked by Gairdner† in the case of a man, aged 27, who died in the Royal Infirmary, Edinburgh, in 1854. His cough had a paroxysmal character as in croup, and it was extremely violent. The voice, too, was harsh and low, although no disease of the larynx was present.

In this case there was a large cyst in the upper lobe of the right lung, towards its anterior surface.

In the case of a young married lady, aged 20, whom I saw in consultation with Dr. Verco lately, the cough had a well-marked croupy clang. There, too, the hydatid was situated at the apex of the right lung.

It would be interesting to observe, whether this croupy character of cough is always associated with hydatid cysts situated in the right apex, and therefore possibly exerting an influence by pressure or irritation upon the right recurrent laryngeal nerve.

It has already been stated, that while the cyst is small and causes no local congestion or inflammation, the cough is dry and not accompanied by any expectoration.

Cough, possessing such characters, may persist for months or years, especially in the case of cysts occupying the pleural cavity.

But although the hydatid usually causes scarcely any irritation in its vicinity, yet it may set up, at times, a localised Bronchitis, Pneumonia, or Gangrene : the patient will then exhibit the characters of cough and expectoration proper to these conditions.

In many cases the foetor of the expired air and of the sputa leads to a suspicion of gangrene when this condition is not present ; the offensive smell being due to decomposition of the contents of the hydatid sac.

HÆMOPTYSIS.

This is as important a symptom of Hydatid of the Lung as it is of Phthisis.

* Union Médicale, 1861, p. 308.

† Edinburgh Medical Journal, 1857, p. 587.

According to Drs. C. J. B. Williams and Charles Theodore Williams* more or less blood-spitting was recorded in 57 per cent. of 1,000 cases of Phthisis noted by them, and in from 53 to 63 per cent. of cases tabulated by Drs. Cotton, Pollock, and others, connected with the Brompton Consumption Hospital.

Now, owing to the scanty data supplied by many of the cases of lung hydatids tabulated by me, I do not feel justified in making any definite numeral statement as to the frequency of hæmoptysis in pulmonary hydatids, yet I feel well assured, that it is present at some stage of the disease in fully as high a proportion of cases as in phthisis.

I would suggest that special enquiry into this point should be made by this society, as a matter for collective investigation.

Meanwhile, I think that it would be safe to assert, that scarcely any case of hydatid of the lung runs through its entire course up to complete elimination of the cyst, without more or less blood-spitting.

Hearn† remarks that there was scarcely one-fifth of the cases collected by him, in which the occurrence of hæmoptysis was not specially mentioned, and moreover, in a considerable number of the cases comprised in this one-fifth, it was stated that the patient had a phthisical aspect, and hence that we are warranted in the suspicion, that there probably had been some expectoration of blood.

In 91 of the cases collected by me, hæmoptysis is alluded to ; as regards its amount, it was—

Slight...	...	...	in 26 cases.
Moderate	...	...	in 42 “
Severe	...	...	in 20 “
Rapidly fatal...	...	...	in 3 “

—
91

It seems to be probable that this symptom is less common in cases of pleural cysts than in true pulmonary hydatids, and Hearn thinks that we may formulate as a general law, the following proposition, viz.:—

“Hæmoptysis is the rule in cysts of the lungs, the very rare exception in cysts of the pleura.”

The blood-spitting is usually repeated, and its amount may vary from a mere streak up to a copious and even fatal hæmoptysis.

Dr. Dougan Bird remarks that the hæmorrhages of pulmonary hydatids may be divided into two categories, viz.:—

1. Those occurring prior to the rupture of the cyst.
2. Those accompanying or following the rupture of the cyst.

* Pulmonary Consumption ; by C. J. B. Williams, M.D., F.R.S., and Charles Theodore Williams, M.A., M.D., Oxon ; London, 1871, p. 298.

† Kystes Hydatiques du Poumon et de la Plèvre, p. 24.

This is an important clinical distinction ; for the hæmorrhages of the first period are generally inconsiderable in amount, there being a mere oozing of blood indicated by blood-stained or streaky sputa.

On the other hand the hæmoptysis of the second period is usually far more considerable, it may even be very profuse, and cause suffocative dyspnœa or fatal anæmia.

At present no reliable data exist for the determination of the absolute or relative frequency of these varieties of blood-spitting.

This will not appear remarkable, when it is remembered that until recently the symptomatology of pulmonary hydatids was almost an unknown chapter, and it is a matter of satisfaction to us, as medical practitioners in Australia, that medical science owes much to one of our Victorian *confrères* (Dr. Dougan Bird, of Melbourne), for what knowledge it now possesses upon the subject.

Our present knowledge upon this point may be briefly summarised as follows :—

The Hæmoptysis of the first stage is very rarely, if ever profuse, and when it occurs, it usually is in the form of spots or streaks of blood on the sputa.

It is probably due to the occurrence of active congestion in the lung-tissue adjacent to the parasite ; or to passive venous congestion, occasioned by the pressure of the cyst ; or in some cases to the presence of local pneumonia in the surrounding lung-substance.

As has been already stated, it is at present uncertain in what proportion of cases this form of hæmoptysis is present, but it is certain that an hydatid may attain the size of a hen's egg or larger, without being accompanied by the least trace of blood-spitting until the moment of rupture.

HÆMORRHAGES ACCOMPANYING OR FOLLOWING RUPTURE OF THE CYST.

It is probable that more or less blood-spitting always accompanies this accident, and often the quantity of blood thus lost is copious ; thus I have known it to be estimated by the patient as about a pint.

It is accompanied by the expectoration of a large amount of watery fluid and sometimes of pus, and the patient frequently describes the mixed sputa as having a very unpleasant taste, and sometimes a disagreeable odour.

The watery fluid that escapes at the moment of rupture of the cyst is evidently the native fluid of the parasite, the pus, that sometimes is discharged at the same moment, is no doubt due to an inflammatory process, caused by the irritation of the parasite, and which has been pent up in the interior of the sac, and not permitted to escape in consequence of the blocking up of the bronchial opening or openings by the parasite.

That more or less loss of blood should accompany the rupture of the cyst is only natural.

If we consider the local conditions present the cause will be clear.

When the wandering embryo settles itself in the lung a process of encapsuling occurs, which results in the formation of a fibrous sac. With the advancing growth of the parasite, the capsule expands, the lung tissue is first compressed and ultimately destroyed, to an extent proportionate with the size of the hydatid. Meanwhile the bronchial tubes and blood-vessels likewise suffer from the pressure. Many of the smaller air-tubes are compressed, closed, and disappear, but usually some of the larger ones remain patent, and terminate by open mouths on the walls of the cavity. Whilst the integrity of the Echinococcus cyst is maintained, these openings are closed by the tense and closely applied wall of the parasite.

As regards the blood-vessels, these too, when of small size, undergo degeneration and atrophy in consequence of the pressure, but some of the larger ones, although they become thickened and degenerated, yet remain patent, in consequence of the relatively great pressure of blood in their interior. Whilst the cyst is unruptured they are evenly supported by its elastic pressure, and thus their brittle walls are enabled to sustain the pressure of blood in their interior.

The amount of pressure exerted by the fluid contents of the normal hydatid cyst is always considerable and sometimes very great.

Its amount has not been estimated in a sufficiently large number of cases to permit an exact statement upon the point, but it is probable that the *intrinsic* intracystic pressure of a medium-sized hydatid is usually from 10 to 12 inches of water.

But the pressure exerted by the cyst is actually much greater in many cases, for when it attains a large size it becomes subjected to the *extrinsic* pressure of neighbouring muscular agencies.

For example, in the case of a large lung hydatid, we have to regard not only the intrinsic elastic tension of the cyst wall, but also the influence of the extrinsic pressure of the diaphragm ; of the opposite lung, heart, &c., acting through the mediastinum.

The result is that the actual pressure of fluid inside the hydatid cyst may rise, as in one case measured by me, to 25 inches during inspiration, and 30 inches during expiration, and in this case, the coughing and violent expiratory efforts which occurred in the course of a few seconds caused an amount of tension in the cyst, sufficient to force the greater part of the fluid contents of the manometer to a distance of several feet beyond the instrument.

The potential fluid pressure of a pulmonary hydatid has a very important bearing in many directions, some of which I shall allude to later on.

At present I call your attention to the considerable amount of support that it must give to the blood-vessels that still remain permeable to blood, on the wall of the fibrous capsule.

When this is suddenly removed by the rupture of the cyst, it is almost unavoidable that some of the vessels should burst and cause hæmorrhage.

The hæmoptysis that takes place at a greater or less distance of time after the occurrence of rupture is of very great importance, inasmuch as it is often very copious and occasionally fatal.

Hæmorrhages of this class are closely allied to those that occur in the third stage of phthisis, and are probably induced in the same manner.

In considering the hæmoptysis seen in the third stage of phthisis, it should, of course, be borne in mind, that it does not always happen, when blood-spitting occurs in a patient who has a cavity in his lungs, that the blood expectorated comes from the cavity itself, or indeed from the lung containing the vomica, for it may be derived from another part of the same lung or from the opposite one; in fact, it may be a hæmorrhage of an early stage of phthisis in a portion of lung remote from the cavity.

The true vomica hæmorrhages are usually very profuse, and are often immediately fatal.

They depend upon one of two local causes.

1st. Erosion of a branch of the pulmonary artery or vein on the walls of a vomica; or

2nd. Rupture of a pulmonary aneurysm, or of a varicose dilatation of the pulmonary vein in the interior of the excavation.

In the cavities sometimes left after the expulsion of hydatid cysts from the lungs, somewhat similar conditions prevail, for the vessels may lie as it were dissected on their walls, or may be found to traverse the cavity itself from one wall to the opposite one.

Thus Bouvier* records the case of a woman, aged 65, who died of meningitis.

In the lower lobe of the left lung was a large hydatid, the fibrous capsule of which "was formed by a cellular membrane, along which projected the vascular branches denuded, and as it were dissected in a part of their course."

Occasionally vessels may entirely traverse cavities, and yet retain their lumen unobliterated, thus Schrötter† relates.

A case where there was found post mortem, in the upper lobe of the left lung, a cavity of the size of a walnut filled with a puriform fluid; this was crossed transversely by an unobliterated artery of the thickness of a thread.

In such cases it is only natural to expect that rupture should easily take place; an instance of this occurred in a case of Professor Waldeyer's recorded by Wolff.‡

* Hydatides du Poumon. Bull. Acad. Royal de Méd. de Paris, 1842-43.

† Mediz Jahrbücher, Wien, vol. xiv. Cited by Hearn and Carrière.

‡ Vier Fälle von Echinococcus hominis, nebst Bemerkungen über das Vorkommen der Echinokokken in Breslau. Inaugural-Dissertation, 1869.

Here a large hydatid cavity was present in the right lung. In the lower part of the cavity was found a branch of the third order of the pulmonary artery, which showed a longitudinal erosion, one centimetre long. (0.39 inch.)

I have not yet met with a case where a distinct pulmonary aneurysm has been found, in an old hydatid cavity, but this is probably merely because special enquiry into this point has not not been made in a sufficient number of cases.

However, Dr. Habershon* has placed on record, a case in which a pulmonary varix had formed adjacent to the wall of an old hydatid cavity and had ruptured into it, causing profuse and ultimately fatal hæmorrhage.

"The branches of the pulmonary artery were traced downwards, and a large branch was found to run over the wall of the cavity in immediate contiguity with it, but no twig of it could be found passing into the cavity. The vein could not be traced from above, but it was found that immediately below the cavity, towards the edge of the lung, there was a dilated vein measuring half an inch in circumference, which had been perforated, and opened directly into the cavity. This had evidently been the source of the hæmorrhage. It was, in fact, a pulmonary varix. In the bronchial tubes of both lungs and the trachea were elongated coagula of blood." (See Plate 1.)

In some cases the hæmorrhage from the wall of the cavity may be concealed, although sufficiently copious to determine a fatal issue.

An interesting case of this kind was observed by Pilon.†

It was that of a man, aged 28, who was admitted into the Hospice St. Antoine in February, 1836. He had suffered from cough, and other chest symptoms, for some months prior to his death. There had been some blood-spitting, but none for a considerable time before his death, nevertheless at the post mortem examination a huge hydatid cyst was found which replaced the whole of the left lung, excepting a small portion of the anterior edge, and its cavity was entirely filled with a huge mass of coagulated blood, not less than a litre (35½ fluid ounces of English measure) in amount.

What is especially curious in this case is the fact, that the cavity communicated with the first upper division of the left bronchus, and yet hæmoptysis was absent just before death.

PAIN IN THE CHEST.

This may be present or absent. If present it may be severe or slight.

The existence and characters of the pain depend upon several conditions, notably upon whether the cyst is ruptured or not, and if ruptured, whether the fluid escapes into the pleural cavity or into a bronchial tube, &c.

When the cyst is unbroken it is usual for no pain at all to be complained of, or if any be present, it amounts to little more than a sense of weight or discomfort in the chest, but it occasionally happens that there is the sensation of the presence of some foreign body in the lung.

* Guy's Hospital Reports ; third series, vol. xviii., p. 374.

† Bull Soc. Anat., Paris, 1836. Cited by Davaine, Hearn, and Neisser.

DESCRIPTION OF PLATE 1.

Illustrating Dr. Habershon's Case of Hydatid of the Lung.

FIG. 1 represents the lower lobe of the lung, containing the contracting cavity from which the hydatid had been expelled. The part is laid open, so as to show both halves of the section, which are respectively entitled *A* and *B*.

a, á are the two halves of the cavity.

b is a large bronchial tube, opening directly into the cavity.

c is a probe passing into a small aperture, through which the hydatid cavity communicates directly with the pulmonary varix, displayed in fig. 2.

d, d, d, are scattered groups of tubercles. At *d'* these are calcified.

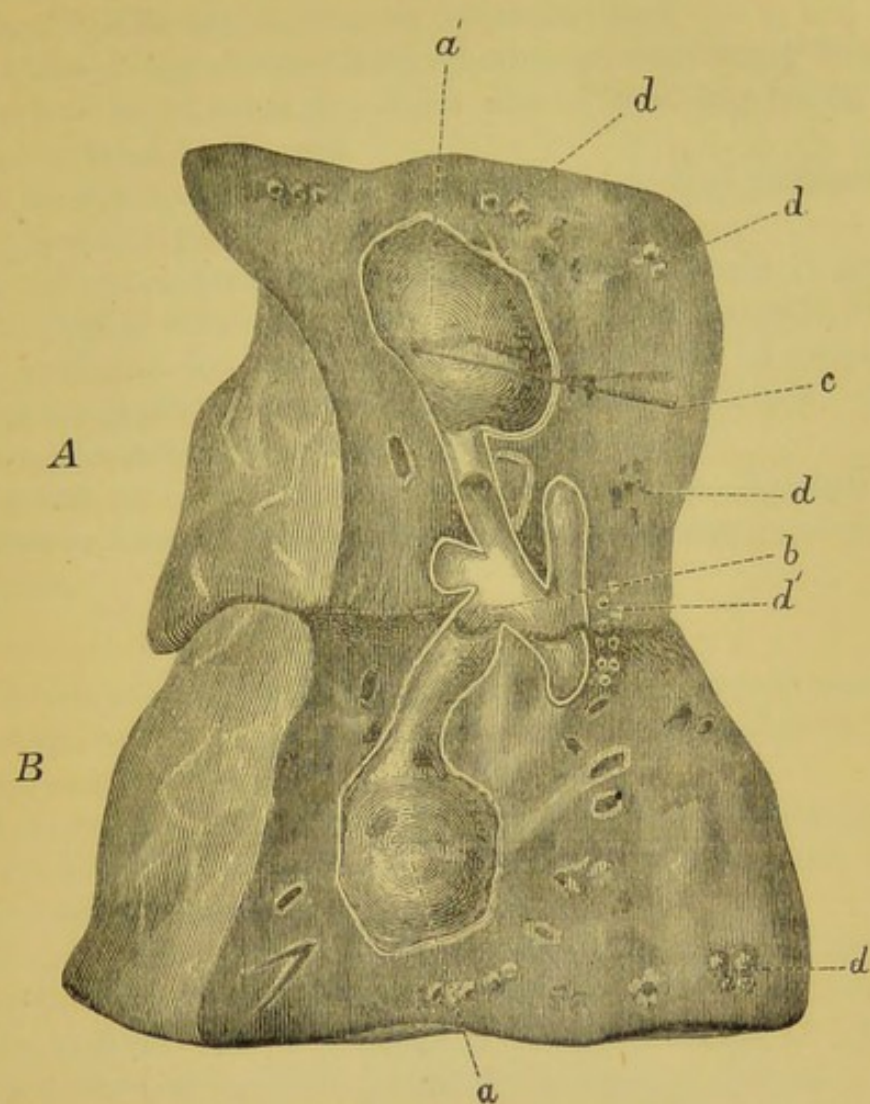
FIG. 2 represents the other surface of the section of lung marked *A* in fig. 1.

c' is the other end of the probe marked *c* in fig. 1, passing from the hydatid cavity into the pulmonary varix, which is seen to form a cylindrical tube, abutting by a broad extremity on the surface of the lung.

e is a branch of the pulmonary artery, of considerable size, the ramifications of which have been laid open, and were found not to communicate in any way with the hydatid cavity.

The specimens represented in these figures are preserved in the Museum of Guy's Hospital.

FIG. 1.



LEEDS & WEST-RIDING
MEDICO-CHIRURGICAL SOCIETY

FIG. 2.

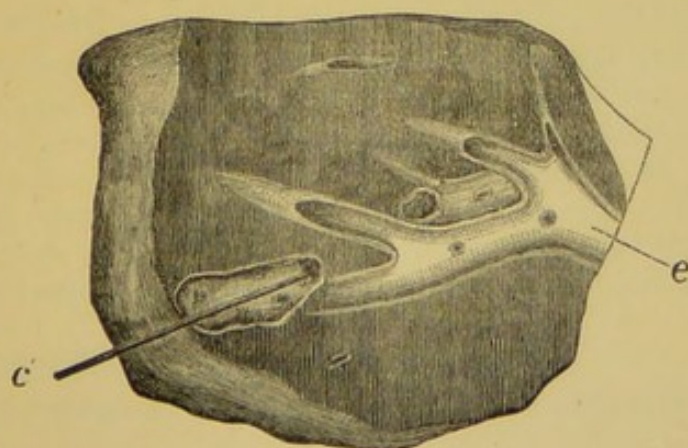


PLATE 1.

THE WESTERN
SOCIETY

Pain is not rarely due to the presence of pleurisy in the neighbourhood of the parasite, although rupture has not taken place.

At the time of rupture there is the sensation of something giving way in the chest, and the patient is sometimes able to refer the feeling to the exact spot occupied by the cyst.

When the cyst bursts there is the distressing feeling of suffocation, due to the gush of fluid into the bronchial tubes.

When the cyst ruptures into the pleural cavity, the pain is sometimes very severe, but in some cases, when the hydatid contains only clear fluid contents which pass into the pleural cavity, the pain may be comparatively slight, but the patient may have a sharp attack of urticaria. In such cases the new symptoms may pass away in a few days.

Pain is said to be a more prominent symptom in Hydatids of the Pleura than in those of the lungs, but this is a point that requires further investigation.

DYSPNŒA.

More or less shortness of breath is always present when any considerable portion of one or both lungs is invaded by any disease, so that the ærating surface is lessened or impaired.

When a hydatid is small, the area thus rendered useless is so insignificant, that the lungs may be equal to any calls made upon them, and then no respiratory trouble results.

Owing to the slow growth and comparatively unirritating character of the unruptured cyst, urgent dyspnœa is not common even in very large pulmonary hydatids. Indeed nothing in the whole range of pulmonary pathology is more curious than the frequent absence of dyspnœa, in cases where a considerable area of the lung is replaced by a large cyst.

I have seen cases where fully half, and less frequently nearly the whole, of one lung has been destroyed in this way, and yet no marked dyspnœa was present excepting on exertion.

Life may be maintained for a considerable period when a large proportion of the entire breathing area of the chest on both sides has been thus lost.

A remarkable case of this kind is recorded by Geoffroy and Dupuytren.*

It was that of a young man, who died in a paroxysm of dyspnœa. In the left lobe of the liver there was a hydatid, and in each pleura a voluminous cyst, which extended on each side, from the apex of the chest to the diaphragm; each contained an enormous solitary parasite, filled with about five-and-a-half pints of clear fluid. The heart was pushed down to the epigastrium, the lungs compressed, flattened, and pushed towards the anterior part of the chest.

This man died of the mere loss of breathing space.

In some of the recorded cases the dyspnœa had a paroxysmal character, but this is rare.

* Bulletin de l'Ecole de Médecine, 1865.

The presence of some intercurrent disease, such as Phthisis, Bronchitis, Pneumonia, or Gangrene adds greatly to the difficulty of breathing.

From what has been just stated, it may be concluded, that unless a very large area of lung is invaded, or some intercurrent pulmonary affection is present, the unruptured hydatid cyst causes remarkably little dyspnœa, and produces only a shortness of breath chiefly felt upon exertion.

Intense Dyspnœa may arise under the following circumstances :—

- 1st. Rupture of the cyst into a bronchial tube.
- 2nd. Rupture into the pleural cavity.
- 3rd. Perforation of the pericardium.
- 4th. When the circulation through the pulmonary artery or vein is seriously impeded.
- 5th. In rare cases, severe dyspnœa and death may result in consequence of the extensive destruction of lung-tissue by the parasite.

1. Dyspnœa from rupture into a Bronchial tube.

The rupture of a hydatid into a bronchial tube is an event of extreme importance, and its study will repay any attention bestowed upon it.

I therefore venture to invite your special attention to the conditions present.

We have a membranous bag, containing watery fluid, in a high state of tension ; this is exactly enveloped by an excavation in the lung, and upon the walls of this cavity one or more bronchial tubes may open. The position of these openings varies in different cases, for the inlets may be placed anywhere from the top to the bottom of the cavity ; whilst the cyst retains its integrity, the bronchial openings are occluded by it ; but when the cyst ruptures, either spontaneously, or as the result of some mechanical injury, then immediately the fluid is forcibly ejected from the interior of the parasite into the enveloping cavity. If the bronchial openings are so situated as no longer to be closed by the now collapsed cyst, then a great volume of watery fluid, usually mixed with blood, pours into the bronchial tract. Violent cough, with deep inspiratory efforts follow, and if the discharge of fluid is copious, a large quantity is sucked backwards by the inspiratory efforts, so that the whole bronchial tract of both lungs is flooded with watery fluid ; this inevitably causes intense and sometimes rapidly fatal dyspnœa.

In the last-named case the patient dies of asphyxia. The face becomes dusky ; there is frothing at the mouth ; after death the usual signs of suffocation are found, and the bronchial tubes are filled with frothy fluid, due to the churning up of air with the fluid sucked in from the upper air-tubes.

I have no hesitation in asserting, that some at least of the sudden deaths from lung hydatids have been caused in this way.

The inspiration of fluid into parts of the lungs remote from the original

seat of the parasite is not only probable on *a priori* grounds, but is amply proven by the fact, that fragments of hydatid membrane have actually been carried backwards in a similar manner, into the bronchial tract of the lung opposite to the seat of the hydatid from which it was detached. This has already been alluded to by me, as having occurred in a case reported by Dr. Broadbent.

In further confirmation of the importance that should be attached to this process of inhalation, I may point out the phenomena that accompany the effusion of a great quantity of blood into the bronchial tract of one lung.

Dr. Reginald E. Thompson* has drawn particular attention to the pathological results of the inhalation of blood poured out in one lung, but sucked back into the opposite one.

For example, in case xii. p. 42, he mentions the case of a man, aged 37, who suffered from an aneurysm, proceeding from the under part of the arch of the aorta, and opening into the *left* bronchus by a small opening; here the *right* lung was "completely gorged with blood from apex to base," and its bronchi were full of blood. Indeed, in this case there was far more blood sucked back into the right lung than into the left one. This evidently was due to the obstruction of the left bronchus by the aneurysm, and of course, the resulting diminution of suction power in the left lung.

And so vigorous is the inhaling force of sound lungs, that in such cases it can overcome the influence of gravitation. This is well shown in Plate I of Dr. Thompson's work, where the apex of the right lung shows almost as many collections of blood as the base does.

In this connection I may refer to a case communicated to me by Dr. Lonsdale Holden, of the Hobart Hospital, in which I am strongly of opinion, that death occurred from flooding of both lungs by hydatid fluid.

It will be related in discussing the operative treatment of pulmonary hydatids.

As regards the frequency of rupture into the Bronchial tract.

It happened in 102 out of the 208 cases *not operated on*, with the following result :—

	Cases.
Recovered.....	63
Died.....	25
Result not recorded.....	14
	—
	102

From this it would appear, that rupture into a bronchus is not very unfavourable to a patient's prospects of recovery, but it must be remembered, that many of the cases operated on, had ruptured in this direction, and that without operation most of them would have died.

* The Causes and Results of Pulmonary Hæmorrhage, London, 1879.

Causes of rupture into the Bronchial tract.

In some cases, and these constitute perhaps the great majority, rupture takes place spontaneously, and without any apparent determining cause, and this may happen even in the case of cysts of small size.

For example, in the case of a young lady, aged 19, whom I saw in 1877.* One morning, whilst she was quietly seated in an arm-chair, and "not even talking," she suddenly felt something give way at the top of the right lung. She immediately brought up a considerable quantity of blood and several shreds of hydatid membrane. Indeed she expectorated the whole cyst almost at once. The physical signs clearly pointed to the apex of the right lung as the seat of the cyst. Recovery was rapid and complete. I have examined this patient's chest recently (1884), and have found no trace of the former lesion, nor has she had any lung symptoms during the last seven years.

Numerous cases of the same kind could be recited.

However, sometimes a determining cause can be traced.

Thus in case of a woman, aged 36, recorded by Fouquier,† rupture into the pleura and bronchial tubes occurred simultaneously, as the result of a fit of violent anger.

In the case of one of my patients, rupture seems to have resulted from stooping to pass through a fence, and some ordinary muscular exertion has in several instances been the cause.

In the case of another patient of mine, a boy aged 14, a slight blow on the chest, received in "sparring with his brother," sufficed to cause rupture.

2nd. *Rupture into the Pleural Cavity* under certain circumstances causes severe dyspnoea.

The severity of the symptoms that follow rupture in the pleural cavity varies, according to circumstances.

Thus, if the orifice of escape be small, such, for instance, as that caused by puncture with a fine trochar or aspirator needle, and the contents of the cyst be normal, clear, hydatid fluid, the resulting symptoms may be comparatively slight; moderate pyrexia, temporary pneumo-thorax; signs of pleural effusion, and a sharp attack of urticaria may be the only consequences.

Usually, however, the opening is larger, and it may even permit the escape of the entire cyst into the pleural cavity.

Cases of complete escape of the entire parasite into the pleural cavity have been recorded by Bally‡ and by Garreau.§

Far more commonly, the mother cyst does not escape into the pleural cavity, but only the fluid contents and daughter cysts, if the latter be present.

* Medical Times and Gazette, February 26, 1881, p. 235.

† Clinique des Hôpitaux. Cited by Cruveilhier, Davaine, and Hearn.

‡ Journal des Connaissances Médicales. Cited by Hearn.

§ Hydatides du Poumon. Thèse de Paris, p. 44.

Frequency of Rupture into the Pleural Cavity.

This occurred without doubt in nine cases, all of which were fatal in from one to 46 days after the rupture took place.

In one case, recorded by Finsen, rupture into the cavity of the pleura seems to have occurred, and yet the patient recovered, and once in an operation case I have seen the same result. It is likely that a favourable issue can happen only when clear normal hydatid fluid, without much air enters the pleural cavity.

The causes that determine rupture into the pleural cavity are those that lead to rupture into a bronchus, excepting that a process of softening or ulceration probably first occurs at the spot of rupture.

A curious example of this accident, induced by an injury, is mentioned in St. George's Hospital Reports.*

The patient, a man, aged 47, fell off a cab and the horse fell on him. He died on the next day, and at the post mortem examination, the fifth and sixth ribs were found fractured near their angles, one of the fractured ribs had torn a small rent in the sac of a hydatid, occupying the left lung, causing evacuation of its contents into the pleural cavity.

Rupture may take place simultaneously into the pleural cavity, and into the bronchial tract.

This must, indeed, usually occur when the pleura is perforated.

3rdly. Extreme dyspnœa follows the rupture of a pulmonary hydatid into the pericardium, and death may then occur even before indications of pericarditis have time to develop.

Up to the present time I have found only one case of this kind recorded.

It is reported by Alibert.†

It occurred in a man, aged 39, who had suffered for three years from a dull pain in the right side of the chest, with cough and dyspnœa. The physical signs pointed to a hydatid cyst at the base of the right lung. After a night of extreme dyspnœa, with tumultuous cardiac action and precordial pain, he died.

P.M.—The cavity of the pericardium contained a large quantity of inodorous limpid fluid, but its lining membrane retained its normal colour, thickness, and transparency. On the right side of the chest, situated between the diaphragm, the lung, and the considerably displaced heart, there was found a hydatid cyst of the size of the head of a child one year old. This had ruptured by a recent opening of small size into the pericardium. The orifice was situated behind the right auricula in front of the vena cava inferior.

4thly. Extreme dyspnœa is present when the circulation through the pulmonary artery or vein is seriously impeded.

This will be seen by perusal of the table already referred to, and yet in

* Vol. IV., p. 272 and 305.

† Journal hebdom de Médecine, Paris, 1829. Cited by Davaine, p. 427, and Hearn, p. 116.

some of these cases there was a remarkable absence of this symptom. For example, in case 5.

5thly. In rare instances, extreme and even fatal dyspnœa result, merely from the great extent of lung area invaded by cysts.

Andral relates the case of a middle-aged man, both of whose lungs were so destroyed by hydatid cysts that not enough lung tissue was left to carry on respiration. In some of these cases death occurred in a severe paroxysm of dyspnœa or coughing, apparently apart from rupture of the cyst.

Of course the presence of hydatid cysts in the upper part of the abdomen simultaneously with pulmonary cysts aggravates the dyspnœa. In like manner ascites or tympanitis produce disastrous results.

GENERAL SYMPTOMS.

As a rule, the general health and physique suffer remarkably little when the cyst is unruptured, and an appearance of tolerably good health is usually maintained, even after rupture, and this peculiarity is often of great value as an element in the diagnosis between pulmonary hydatid and phthisis.

Of course it is not universally so.

Loss of flesh is usually, but not always, noticeable, but it rarely attains a high degree, even in the ruptured cyst. It is dependent chiefly upon the presence and amount of pyrexia, whether due to the irritation of the parasite, septic poisoning, or concomitant phthisical or other changes in the lungs.

PYREXIA.

This is not usually present in the first stage. It is common after rupture.

When found in cases of unruptured hydatid it is probably always due to some intercurrent disease, *e.g.*, Pneumonia, Pleurisy, Phthisis, &c.

In the stage of ruptured cyst, more or less fever is usually present.

The frequent presence of *night sweats*, and of *clubbing of the finger-ends*, increases the resemblance between certain cases of ruptured pulmonary hydatids and the ordinary cases of Phthisis.

As improvement occurs, whether it be the result of successful natural efforts to expectorate the mother cyst, or whether it be produced by surgical treatment, these symptoms disappear entirely.

DECUBITUS.

When the cyst is small the patient usually lies indifferently on either side. When large he commonly prefers the affected side. When ruptured, alterations in the position of the collapsed cyst may in certain postures induce coughing, by permitting escape of the fluid contents of the cavity into the bronchial tubes.

As usual, when dyspnœa is severe he sits up.

THE PHYSICAL SIGNS OF PULMONARY HYDATIDS.

The physical signs of Lung Hydatids, like their symptoms, have to be considered in relation to the unruptured and the ruptured cyst.

Physical Signs of the Unruptured Cyst.

Before proceeding to discuss these phenomena, it would be well to reflect what the physical conditions present are.

We have a tense elastic bag, containing in its normal state, clear watery fluid. This is enclosed in an excavation, hollowed out in the lung and lined by a more or less well-marked fibrous envelope. If the cyst is of small size the adjacent lung tissue remains unaltered, but if the cyst is so placed, or of such dimensions, as to compress the lung against some resistant medium, such as the chest-wall, mediastinum, or diaphragm, then the intervening lung tissue becomes condensed, indurated, and quasi-solid, and to a greater or less extent atrophied and destroyed.

In some instances, as the result of the mechanical pressure on the vessels or the local irritation of the parasite, *Bronchitis*, *Pneumonia*, or *Gangrene*, may be induced in the neighbourhood of the cyst; but this is not very common, and in general terms it may be stated, that the local effects of the unruptured hydatid are limited to the area of lung which it occupies, *i.e.*, it is in short a purely local lesion.

Hence it follows, that a small hydatid imbedded deeply in the lung may not betray its presence by any alteration of the normal physical signs, or the alterations may be so slight as scarcely to attract attention.

And yet, even in cases of very small cysts deeply imbedded, some slight abnormality of chest signs may sometimes be detected by careful examination.

Andral* relates the case of a woman, aged about 45, who was under close observation during the last two months of her life, and who died of uterine cancer. She showed no chest symptoms, the breathing was free, and she had no cough. Resonance was perfect, *but the respiratory murmur was heard to be more strong in the Right than in the Left lung*. At the post mortem examination there was found about the centre of the lower lobe of the right lung an "acephalocyst" of the size of a large walnut, which contained several daughter-cysts.

When the parasite is of larger dimensions, even if deeply imbedded in the lung, more decided phenomena may be elicited by careful examination, as in the following case that came under my observation :—

Peter Sh——, aged 43, wheelwright, resident on Yorke's Peninsula, consulted me on March 28, 1882.

He had suffered off and on for about six years, from pain referred to the right hypochondriac region, which had on one occasion (four years before he consulted me), compelled him to lay up for about a month. After this time he occasionally spat up bright blood in small amount. The blood-spitting was

* Clinique Médicale, 1840. Tome II., p. 390.

especially induced by mental excitement rather than by physical exertion. More or less cough, accompanied by glairy expectoration, came on almost imperceptibly to him.

When I examined him the only physical signs that I could discover were tympanitic resonance over a limited area at the lower part of the right lung in front; friction was audible over this hyper-resonant region, but no distinct respiratory murmur. (See Plate ii. and iii.)

I suspected a hydatid cyst deeply seated in the interior of the base of the right lung, in front, and suggested an exploratory puncture with the aspirator.

This was declined, and I saw no more of the patient for about two years. He then returned to me, and I now found an enormous hydatid, occupying nearly the whole of the right lung. He was operated on and died. This case forms one of the series to which I propose to invite your attention.

At present I wish only to point out the somewhat singular character of the percussion-note at the suspected locality, viz.:—It was markedly tympanitic, not dull, and in order to prevent needless repetition, I may remark that the occurrence of a tympanitic percussion-note in the neighbourhood of an unruptured hydatid is, in my experience, not very rare.

It must be carefully distinguished from the tympanitic or amphoric note sometimes elicited by percussion over the large cavities caused by the ruptured and collapsed parasite.

The note to which I allude, is probably due to diminished tension of the lung substance, between the cyst and the chest-wall, and therefore it resembles the tympanitic note occasionally heard in cases of pleurisy with moderate effusion. Paul Guttman* remarks that the tympanitic note is, in such cases, to be observed above the level of the fluid in the anterior or lateral parts of the thorax.

I have not observed this phenomenon in a sufficiently large number of cases of pulmonary hydatids to justify me in making any decisive statement as to the local conditions that induce it, but I believe that when present, it is indicative of the existence of a certain amount of lung tissue permeable to air between the cyst and the surface.

When the intervening lung tissue is more strongly compressed, and *a fortiori*, when it has more or less completely disappeared, so that for all practical purposes the hydatid touches the chest wall, a group of very distinctive physical signs is present, and the diagnosis becomes in the majority of cases a scientific certainty.

In connection with the diagnosis of unruptured pulmonary hydatids, it would be ungrateful not to allude to the excellent work of Dr. Dougan Bird, of Melbourne. As far as my reading goes, no one has, in this direction better earned the gratitude of students of Chest Pathology than has Dr. Bird. In proof of this, I may refer to his numerous contributions

* Handbook of Physical Diagnosis. The New Sydenham Society, 1879, p. 98.

to the Australian Medical Journal, and other medical papers, but more especially to his excellent little work.*

However, as if to illustrate the aphorism that "there is nothing new under the sun," I find that as long ago as November, 1853, Dr. Vigla, of Paris, after a close and prolonged study of a case of pulmonary hydatid, not only established a correct diagnosis, and even pointed out the leading physical signs of the unruptured cyst, but he further operated by puncture upon the patient with complete success.

Vigla published in 1855, an essay† upon this subject, entitled "*Des Hydatides de la Cavité Thoracique*," in which his own case and several others are recorded. This essay is an admirable one, but I believe that for some reason it was never completed. In the November number of the *Archives Générales* he indicates clearly the points of diagnosis between intra-thoracic hydatids and chronic pleural effusions, as well as between "Liquid Tumours" and "Solid Tumours" inside the chest.

In mentioning this I by no means detract from the credit due to Dr. Bird for his excellent work, for the limited experience of Dr. Vigla, cannot be compared with the very extensive experience of our Victorian *confrère*.

As an example of excellent literary work upon this subject, I may allude to the Paris Thesis of Dr. Alfred W. Hearn, entitled "*Kystes Hydatiques du Poumon et de la Plèvre*."‡

Davaine, too, in his well-known work§ has recorded a considerable number of cases of chest hydatids.

Among the earlier contributions upon this subject, I may mention the Paris Thesis of Dr. Garreau.||

The Physical Signs of the Unruptured Cyst are so well summarised by Dr. Bird that I cannot do better than quote his words:—

"Expansion more or less deficient on the affected side; mensuration but little affected; absolute dulness on percussion, with absence of respiratory sounds over a space of the chest-walls not smaller than the palm of the hand, generally in the lateral or infra-clavicular regions, with absence of vocal fremitus in most cases; this dull space always presents a rounded outline, is limited by a line of demarcation so exact, that it can be mapped out with pen and ink, and is unaltered by position; beyond the boundary-line, percussion is clear and normal. The respiratory sounds, though inaudible over the dull surface, commence immediately beyond the pen line, and though probably rather harsh and puerile in character, are indica-

* On Hydatids of the Lung; by S. Dougan Bird, M.D., L.R.C.P. George Robertson, Melbourne, Sydney, and Adelaide; second edition, 1877.

† *Archives Générales de Médecine*, September and November, 1855.

‡ Paris. A Parent, 1875.

§ "*Traité des Entozoaires et des Maladies vermineuses de l'Homme et des Animaux domestiques*." Deuxième édition, Paris, 1877.

|| *Des Hydatides du Poumon*, par Louis Jean Garreau, Paris, 1856.

tive of healthy lung tissue. Besides this, the distinctive vibratile thrill of fluid may sometimes, but not always, be detected by percussion over the intercostal spaces, a perfect exemplification of 'peripheric fluctuation.' The percussion and respiratory sounds over the rest of the lung are probably not much altered."*

There are some points in connection with these physical signs which deserve consideration.

The Percussion-note is, when the parasite lies near the chest wall, absolutely dull. The dullness is sharply defined, and is not moveable in obedience to the laws of gravitation. Its upper outline is more or less curved in accordance with the spheroidal shape of the parasite; this has sometimes been regarded as a reliable distinction between pulmonary hydatid and ordinary pleuritic effusion, but it must be remembered that the upper line of dullness in pleural effusion is not usually really horizontal, as is often stated to be the case in text-books. So many writers ignore this fact, that I venture to quote some very pertinent remarks upon this point made by Dr. Broadbent.† He states:—

"As, then, effusion takes place, the lung, of course, floats upon the fluid, but not like a loose piece of cork. In the first place, it is attached by the root to the mediastinal wall of the cavity; and secondly, as the fluid accumulates it shrinks, in virtue of its elasticity, in all its dimensions, transversely therefore towards the mediastinum as well as vertically, which will tend to withdraw the lateral surface immediately opposite the mediastinum from the chest-walls. In consequence of this, the line of dullness is not horizontal, and does not shift position, with changes of posture, to the degree which you might anticipate, and which we are led to expect by some books. The lower part of the lung is immersed to a certain depth in the fluid, and this rises for a short distance between the lung and the chest-wall, especially at the axillary aspect in the erect position of the trunk, while when the patient is on his back the line of dullness is curved, descending rapidly from the front of the chest at its lower part to the axillary aspect. There is a great difference in these respects, from pneumo-thorax with fluid; the lung in this condition is shrunken and out of the way; and the line of dullness is level, and varies with the position of the body."

The level of dullness is always higher behind than before, and the line of demarcation between resonance and non-resonance is sharper before than behind. (Gee‡).

These facts, which are of little more than scientific interest in Europe,

* Bird, Op. cit.; first edition, p. 19.

† Lancet, May 24th, 1884, p. 925.

‡ Auscultation and Percussion; by Samuel Gee, M.D.; second edition; London, 1877, p. 226.

where pulmonary hydatids are rare, are of considerable practical significance in Australia. The lesson to be learnt is this. That a curved upper line of dulness is not to be depended upon as a point of differential diagnosis between lung hydatid and pleural effusion, unless the line happens, for example, to rise higher in the front of the chest (in the erect posture) than in the axillary region and back ; of more general value is the influence of change of posture in altering the level of dulness in pleural effusion ; but when the cyst is ruptured, even this may be simulated in pulmonary hydatid. But frequently in pulmonary hydatid the cyst does not extend over the entire base of the lung, so that an area of resonance may be found below it, this can happen very rarely in pleural effusion, and only when the lung is bound to the chest-wall at the part by adhesions.

The percussion resistance of hydatid is just as marked as that of pleural effusion, in both we have absolute toneless dulness, with great sense of resistance.

In both, there is loss of vocal fremitus over the area of dulness.

Vocal resonance usually differs in the case of these two conditions.

In the unruptured hydatid it is completely lost, but in moderate pleural effusion it usually has an ægophonic or bronchophonic character. In both cases there may be, as regards ordinary respiratory murmur, absolute silence.

PRESSURE EFFECTS OF PULMONARY HYDATIDS.

When the hydatid cyst has attained considerable dimensions it exercises certain pressure effects upon parts outside the normal boundaries of the lung.

It will be convenient to group the phenomena of abnormal intra-thoracic pressure into two classes, viz.:—

Those which result from pressure exerted upon the central parts of the thoracic cavity within the mediastinum. I mean those about the root of the lung. These comprise cases where the great vessels—the trachea and main bronchi—the vagi, sympathetic and œsophagus, are involved ; these may be termed cases of *centripetal pressure*.

The second class includes those cases where the pressure is exercised chiefly on the walls of the pleural cavity ; for example, the bony thoracic wall, the diaphragm below, and, the general wall of the mediastinum ; these are instances of *centrifugal pressure*.

Of course this classification is one merely of clinical convenience, not anatomical exactness, for I shall regard the collapse of the lung that takes place in pleuritic effusion, pneumo-thorax, &c., as a case of centrifugal pressure.

However, I think it will be admitted that the main clinical aspects of cases of intra-thoracic pressure range themselves conveniently in these classes.

Fluid in the pleural cavity, whether it be serum, pus, blood, or gas, causes centrifugal pressure, it presses the mediastinal partition to the opposite side, presses the diaphragm downwards, and tends to bulge the outer wall of the chest outwards, thence result displacement of the heart, liver, spleen, &c.; but not obstruction of the trachea or bronchi, or interference with the flow of blood through the great vessels, or pressure effects upon the nerves, œsophagus, &c.

Whilst thoracic aneurysm, cancer, sarcoma, and other mediastinal growths produce signs of centripetal pressure.

The pressure effects of pulmonary hydatid are, with few exceptions, centrifugal.

We find the heart, liver, and spleen displaced, according to the size and situation of the cyst; of course a small cyst at the apex can exert no influence upon these organs; but a large one at the base will do so in the same mode as a pleural effusion does, and more or less local bulging of the chest wall may be produced.

This is the general tendency of the hydatid cyst, and is probably due to its proneness to grow in the direction of least resistance. But the parasite is not a mere collection of fluid, it is rather a slowly growing tumour, the contents of which are fluid, and it may conduct itself as a tumour.

For example, in a case of hydatid of the middle and lower part of the left lung, that I had under my care some years ago, the heart was not displaced to the right, as it would ordinarily have been by an equal amount of fluid free in the left pleural cavity, but it was pushed bodily forwards against the chest-wall, so as to show a very widely diffused heat over the whole left mammary region. This phenomenon disappeared after the evacuation by puncture of the hydatid fluid.

In some cases the cyst exerts more or less well-marked centripetal pressure.

Among the cases where venous obstruction was caused by the pressure of pulmonary hydatids, may be mentioned a case by Leroux* where œdema of the upper limbs was present; and another by Williams,† where the right hand and arm were œdematous, apparently from the pressure of a huge hydatid of the right lung.

Cases in which the thoracic aorta appears to have been involved have been occasionally alluded to, for example, Federici‡ has related the case of a woman, where certain disturbances of the circulation were referred by him to pressure on the aorta.

Dr. Atkinson§ briefly alludes to a case in which "severe symptoms of aneurysm of the aorta were simulated."

* Cited by Davaine and Hearn. Obs. vii., p. 115.

† Aust. Med. Jour., 1881, p. 267.

‡ Cited by Hearn. Obs. 125, p. 225.

§ Aust. Med. Jour., Oct., 1867, p. 290.

A well-marked case of this kind has been recorded by Allen.*

A woman, aged 50, was admitted into the Melbourne Hospital, on February 19, 1877.

"The left chest was distended and motionless, its measurements larger than those of the right side; the intercostal spaces were slightly tumid; there was absolute dulness all over the left side, with absence of respiratory murmur, and of vocal resonance and fremitus. The right chest was moderately resonant, the breath sounds were roughened, and attended with rather coarse crepitation.

"The heart's beat could be felt, and its sounds heard, a little to the right of the sternum, a distinct thrill was very perceptible to the right of the sternum, over the upper two intercostal spaces; a loud systolic bruit was heard in the same situation, and could be easily differentiated from the heart's sounds. The superficial veins of the right side of the chest were distended."

The patient died, and at the autopsy.

"The pericardium and its contents were seen to be displaced to the right but unequally; there was almost universal firm adhesion between the parietal and visceral layers of the pericardium; the heart's apex was retained nearly in its usual position, while the base and great vessels were pushed over to the left (right?); the walls of the heart were very flabby; its cavities were not sensibly dilated; the valves were normal, and there was no aneurysm nor dilatation, nor any trace of atheroma of the aorta or any of its branches. The left pleura was distended by a huge hydatid cyst, which was covered above by the collapsed, almost airless slate-coloured remains of the left lung. The cyst cavity extended downwards to the diaphragm, displacing the liver downwards and to the right."

In this case, the symptoms to some extent, simulated aortic aneurysm, but the well-marked dulness and absence of respiration all over the left side of the chest were indicative of something more than or different from aortic aneurysm.

It is unusual for pulmonary hydatids to cause erosion of bones.

I have already alluded to a case where the vertebræ were found eroded, and the vertebral canal invaded by hydatid disease, but I have raised doubt whether this should be regarded as a case of invasion by a hydatid originally of intra-thoracic origin.

Landau† has recorded a case of hydatid of the right side of the chest where the cyst protruded under the breast, and had eroded the ribs in the parasternal line, causing over an area of about three centimeters square, a defect in the chest wall, with complete destruction of the ribs and intercostal muscles of the part.

THE PHYSICAL SIGNS OF THE RUPTURED CYST.

In some cases the cyst may be ruptured, and part of its contents be evacuated, and yet it may refill, and the parasite probably still retain its vitality.

* Aust. Med. Jour., March, 1881, p. 104.

† Archiv. für Gynækologie viii., Heft. 2.

That this can occur after a minute puncture made artificially, I am sure, but I have no proof that it can take place after the more extensive tearing of the cyst that occurs in spontaneous rupture.

When a once ruptured cyst refills, it is, as regards physical signs, in the same condition as if it never had been ruptured.

When, however, this does not occur, the local conditions become entirely altered, the parasite shrinks and occupies the most dependent part of its cavern. The physical signs of fluid tumour are then replaced by those of a cavity of large size.

But it must be remembered that the hydatid cavity is in a very different condition from a vomica, the result of Phthisis, Gangrene, Abscess, or Cancer, for in the cases of all the last-named diseases the only contents of the excavations are gas, and more or less liquid ; in the Hydatid cavity there are the extensive remains of the parasite, so that until this has been expectorated or otherwise removed, it may, and often does, produce an appreciable influence upon the acoustic properties of the cavity.

I need not refer to the usual physical signs of lung cavities, for they are familiar to all of us.

They vary, according to the size of the cavity, the condition of its walls, the size and position of the bronchial inlets, its distance from the chest-wall, and the condition of the lung tissue (if any) that intervenes between the end of the stethoscope and the interior of the cavity. Of great importance too, are the amount and nature of the contents of the vomica.

As this last element has a special significance in connection with pulmonary hydatid, I wish to allude to certain acoustic phenomena that have been noticed by various observers.

PERCUSSION.

The unruptured cyst yields, under ordinary circumstances, an absolutely dull note ; when it bursts from any cause, and expels its contents, air replaces liquid in the cavity, and we then have a tympanitic, tubular, cavernous, amphoric, or cracked-pot note, according to the local conditions, but in many cases the percussion-note remains as dull as before.

This may occur, because the cyst refills, and the previous physical conditions are restored ; but this is not always, probably not even often, the case, and I believe that the cause of dulness then is, that the collapsed mother cyst, or one of its daughter-cysts, closes the bronchial outlets of the cavity, and thus prevents the development of the usual phenomena.

The same cause, in my opinion, occasions the unusual auscultatory signs sometimes found, for when dulness persists, usually also the cavernous respiration and vocal resonance are either ill-marked or wanting, and vocal fremitus is weak or absent ; all of which deviations are explicable, it seems to me, by the supposition that air enters and leaves the cavity only sparingly, or not at all.

But if a little air enters, it may do so in small jerks past the valve-like cyst plug, and then we hear a peculiar cog-wheel, rhythmical sound. This was very noticeable in the case of H. P.—, recorded by me* in 1881. In this case, at a certain time, in its clinical history, the following signs were present :—

“Posteriorly three fingers’ breadth below the angle of the scapula, there is heard, especially on deep inspiration, amphoric breathing. This sound is interrupted, being split up into several parts or jerks, varying in number with the depth of the inspiration, and not being of cardiac rhythm. This gives a kind of cog-wheel rhythm to inspiration, and to a less degree to expiration also.”

This disappeared after the expectoration of some membrane.

A somewhat similar phenomenon occurred in a patient under the care of Dr. Leared.† The chief physical signs were—

“On the left side, dulness on percussion from beneath a line encircling the chest, and touching the lower angles of the scapulæ. This dulness was very marked posteriorly, somewhat less so at the side, and still more modified anteriorly. The respiratory murmur was found to be impaired in a manner precisely corresponding to the dulness. Bronchial respiration was not noticeable; but there was a well-marked inspiratory valve-like, or clicking sound, and it was most audible about the lower margin of the axillary space.”

Sometimes, when the ordinary respiratory acts are not forcible enough to displace the blocking membrane, cough will do so.

Baron‡ refers to this occurrence in a case under his care, where a somewhat metallic and amphoric sound was heard during coughing efforts only; he offers no explanation of the phenomenon. Similar allusions are made by other authors, *e.g.*, Pillon§ and Bernard.||

As might be expected, when a copious expectoration of hydatid membrane takes place, a very notable change in the physical signs of the ruptured cyst often occurs; the usual cavity signs appearing, *e.g.*, cavernous or amphoric respiration, with whispered pectoriloquy, &c., and perhaps, but not always, the percussion-note alters from dulness to a tympanitic or amphoric note.

This has been often noticed; for example, by Greenfield.¶

The upper part of a hydatid cavity may give intense cavernous breathing, whilst in the lower half the respiratory sounds, vocal resonance and fremitus, may be annulled. This is evidently due to the presence of the collapsed cyst at the bottom of the cavity.

Occasionally mere alterations of the posture of the patient, by producing alterations in the position of the empty mother-cyst, and the fluid present, cause modifications of the physical signs.

* Medical Times and Gazette, Jan. 15, 1881, p. 65.

† Medical Times and Gazette, August 15, 1857, p. 162.

‡ Mémoires de l' Acad. de Méd., 1845. Cited by Hearn. Obs. xx., p. 123.

§ Cited by Hearn. Obs. xxxii., p. 134.

|| Hearn. Obs. cvii., p. 211.

¶ Clinical Society's Trans., vol. x., p. 103.

This was noticed by me in the case of a youth, who had a hydatid in the upper lobe of his right lung.

The same peculiarity was noticed by Fenger and Hollister,* in a case under their care.

In their case, the observation was perhaps the more significant, because the exact nature of the malady was discovered only at the time of operation.

The patient, a man, aged 34, had a suppurating hydatid in the middle lobe of his left lung. In the erect posture there was dulness in the mammary and in the infra-mammary regions; but "when the patient lies on the back, there is an area of tympanitic percussion sound on the anterior side of the body, namely, in the mammary region." There was a similar variation in the auscultation signs. "Over the regions of dull percussion, the respiratory sounds are obscure, when the patient lies down, auscultation over the tympanitic territories gives cavernous respiratory sounds."

The presence of such variations co-relative with posture, may prove at times of value for purposes of diagnosis, but their absence in no way should influence diagnosis.

DIAGNOSIS.

The principal diseases with which Pulmonary Hydatids may be confused are—

Phthisis, Pleural effusion, Pneumo-thorax, Cancer, Sarcoma, and various Mediastinal Tumors, including Aortic Aneurysm.

It may be difficult to decide whether a hydatid at the lower part of the chest is primarily intra-thoracic, or is only apparently so, and really due to upward growth of a hydatid in the liver or spleen.

In the vast majority of cases, Phthisis and Pleurisy with effusion, are practically the lesions to be taken into account.

Phthisis and Pulmonary Hydatids may resemble one another in a very striking manner, and at all stages.

Early Phthisis, and the early condition of an Unruptured Cyst may resemble each other, in the slight impairment of health, the short dry cough, hæmoptysis, and shortness of breath on exertion, but both in this and the more advanced stages, the general health is usually far less impaired in Hydatid disease than in Phthisis, and very considerable lung lesion produced by the former frequently co-exists with a fairly good state of the general health.

It is principally when a cyst is found at or near the apex of the lung that confusion with early Phthisis is likely to occur; but the general good health, the usual absence of pyrexia, not to mention the sharply-defined dulness, the respiratory silence, and the absence of rales should enable a diagnosis to be made with almost absolute certainty.

* Opening and Drainage of Cavities in the Lungs. The American Journal of the Medical Sciences, October, 1881, p. 378.

Finally, puncture with the aspirator or fine trochar will solve all doubts.

In the advanced stages when a cavity has been produced by the rupture of the cyst, the difficulty of establishing a differential diagnosis is greater. But apart from the physical signs already described, there are several points that may throw light upon the question.

In the first place, phthisis is essentially, as regards the lungs, a bi-lateral disease. To find one lung presenting plain cavity signs, and the opposite one healthy, would, in doubtful cases, give a strong presumption in favour of hydatid.

Then diarrhœa and laryngeal disease do not form a part of the morbid phenomena of pulmonary hydatid.

Various collateral phenomena may aid in the diagnosis. For example—

A boy, aged 9 years, came under my care in November, 1877. He was believed to be dying of phthisis, and his general appearance and symptoms justified the opinion. However, upon examination he was found to have the physical signs of a large cavity about the middle of his right lung. The left one was, as far as could be discovered, perfectly healthy, but his heart was found to be beating half an inch to the left of the left nipple line.

These two important points of derivation from the phthisical type of physical signs were conspicuous.

First—A large cavity in a child's lung, with perfectly normal physical signs in the opposite lung ; and

Second—Displacement of the heart away from the lung, containing the cavity. Now, a phthisical lung containing one or more cavities is a small lung, and the heart, when displaced in phthisis, is displaced towards the most extensively diseased lung.

In this case it was plain that a large hydatid in the right lung had pushed the heart to the left ; before rupture of the cyst the lung had formed adhesions, so that when rupture took place the displacement had been rendered permanent.

Of course the expectoration of hydatid cysts or membranes is conclusive, but as Dr. Bird remarks, the physician should never trust a patient's description of the "skins." He ought to see them for himself.

In my experience, diagnosis has, in the great majority of cases, to be made without any such aid.

There are two directions in which further enquiry needs to be made, viz.:—

1st. As to the frequency of expectoration of shreds of lung tissue and elastic fibres in cases of Pulmonary Hydatid cavities.

2nd. Whether the "bacillus" of tubercle can be depended upon as a means of diagnosis in doubtful cases.

As regards the former, it is quite certain that fragments of lung tissue

may be found in the discharge from hydatid cavities when phthisis is quite absent. This has been noticed by Dr. Macgillivray. (See Case 4, Radical Operations, Cures.)

It is difficult to conceive how a large excavation in the lung can be made without disintegration taking place in its walls, and elastic fibre being found in its contents to some extent at least.

Still the point deserves careful enquiry.

As regards the bacillus of tubercle. This, even more than the last named question calls for investigation.

I must confess my inability at present to enter upon such an enquiry.

Perhaps even more frequently than Phthisis, collections of fluid in the pleural cavity cause errors of diagnosis, and it is especially circumscribed empyemata that give most trouble in this way. Already references have been made to the physical signs of pleural effusion and pulmonary cyst.

Of course, it is especially basic hydatids that simulate intra-pleural effusion, but in many cases the history of recent pain, pyrexia, shortness of breath, &c., will give a clue to the nature of the lesion.

In all cases an exploratory puncture will decide the matter, often in a manner alike satisfactory to doctor and patient.

Cavities from gangrene of the lung can generally be distinguished from hydatid cavities, the walls of which have become gangrenous, by the very acute course of the former.

Both are emphatically cases for the Radical operation.

Far less common as sources of error in diagnosis are.

Aneurysm, Carcinoma, Sarcoma, and various other varieties of Mediastinal Tumours.

Aortic Aneurysm has in rare instances been mimicked by hydatid of the lung, but oddly enough, this has not been so when the hydatid was mediastinal.

PULMONARY HYDATID AND CARCINOMA.

Carcinoma of the chest varies in its distribution greatly. Thus, it may be disseminated, almost like tuberculosis (miliary), in which case there may be no physical signs in the lungs except those of general bronchitis. In other cases the disease may be limited to certain parts of the lung, or it may be principally mediastinal.

In the last group of cases there are centripetal pressure signs.

The cases that may be confused with Pulmonary Hydatid are those in which extensive infiltration of the lung exists or cavities are formed.

The varieties of phenomena in such cases of cancer of the lungs are so numerous, that it is out of the question to discuss them; but a careful survey of the physical signs, and the progress of the case will generally decide the question. Exploratory puncture will prove a valuable aid to diagnosis.

When the question is between a ruptured hydatid and carcinoma, the progressive character of the physical signs in the latter is in striking contrast to the non-invading type characteristic of the ruptured parasite.

Finally, it must be borne in mind that physical signs simply indicate physical conditions, diagnosis is almost always a matter of judgment of probabilities.

TREATMENT OF PULMONARY HYDATIDS.

Before entering upon the question of the treatment of this disease, it will be well to consider, what the prospects of a patient are, who suffers from the malady and undergoes no surgical treatment.

Of course, this is by no means an easy matter to decide, and I make statements upon it under reserve.

As far as the facts at my disposal at present go, they are as follows :—

Out of the 264 cases collected, 208 cases either were not operated on, or if operated on no statements upon this point were made.

As regards the results—

Died.....	113	cases
Cured or relieved.....	71	„
Not recorded or doubtful	24	„
<hr/>		
	208	

It would perhaps be better to exclude the 24 cases, about which no information upon the termination was obtained, this leaves 184 cases, about which some definite data are forthcoming. The proportions then stand as follows :—

Died	61·413 per cent.
Recovered	38·587 „

But unfortunately, even this is not a reliable estimate, for we are certain only of the number of deaths.

Many patients, suffering from hydatid disease, leave the Hospital or their private physician, alive, it is true, but by no means cured of their disease.

Cases of hydatid disease that have been repeatedly under treatment, and have been discharged as “Cured” or “Relieved” on each occasion are by no means uncommon. As an example, I may cite the case of E. C.—, from the records of the Adelaide Hospital.

This patient, then aged 10 years, first came under treatment in December, 1873, suffering from an Abdominal Hydatid, she was discharged in about a month, “cured ;” but she re-appeared six months later with the same disease. She was discharged a fortnight after admission “cured” once more.

As regards the cases of death which were, without doubt, directly referable to the Lung or Pleural Hydatid.

They were 79 in number, and the principal immediate causes of death were—

Hæmoptysis	5 cases
Rupture into Pleura	10 „
„ „ Pericardium.....	1 „
Pneumonia.....	3 „
Gangrene of the Lung	5 „
Blockage of blood-vessels of the Lungs ...	7 „
Asphyxia (slow)	5 „
Asphyxia (rapid) from membrane in the air passages	2 „
Asphyxia (rapid) from fluid in the air passages.....	3 „
Asphyxia (rapid) without rupture of the cyst	6 „
Septicæmia, Wasting, Pyrexia, "Decline," &c	11 „
Immediate cause of death not stated	21 „

79

A few remarks upon some of the immediate causes of death may be interesting.

Phthisis was noted only in eight out of the 113 fatal cases. In six instances it appears to me that the cause of death was phthisis, but in the remaining two I think the parasite had a considerable influence in producing the fatal issue.

It is very interesting to notice how little influence in causing *Phthisis* a pulmonary hydatid exerts, and yet in many instances it produces a very chronic suppurative process in the lungs.

Paraplegia.—This occurred in a remarkable case recorded by Liouville and Straus.*

The patient, a man, aged 52, became suddenly paraplegic, and died with the usual symptoms of this form of paralysis. At the post mortem examination it was found that a hydatid cyst had penetrated the spinal canal at the level of the ninth and tenth dorsal vertebræ, and had compressed the spinal cord. The intervertebral substance between the ninth and tenth dorsal vertebræ was destroyed, and the body of the vertebræ hollowed out into cavities in which were contained hydatids, some with opaque and resistant walls, others transparent and fragile.

Between the left lung and the diaphragm was a large collection of hydatid vesicles, showing indications of degeneration.

* Gazette Méd., Janvier 30, 1875. Cited by Hearn. Obs. 81. p. 189.

This case has been regarded as a primary pleural hydatid, with secondary invasion of the vertebræ and spinal canal.

I have, in accordance with the opinions of the reporters, counted this as a pulmonary or pleural hydatid, but I am more inclined to regard it, as in the first instance a hydatid of the vertebræ chiefly diseased, for unless the *Echinococcus* cyst is primarily imprisoned inside a bone, it rarely burrows its way into bone, but grows always in the direction of least resistance. When, on the other hand, the parasite starts life inside a bone it usually causes great destruction of the osseous tissue.

Instances of hydatids originating inside bones are not very rare. For example—Dr. John Ogle* has recorded such a case where hydatids originated in the spinous process of the seventh cervical vertebra, and projected into the spinal canal.

I have recorded in the Proceedings of this Branch,† a case where the primary seat of the parasite was the interior of the right as ilii.

Many other cases might be cited.

Hæmoptysis, as has already been mentioned, is a notable feature of pulmonary hydatid.

In five cases it was so profuse as to have been the immediate cause of death.

In one instance, the hæmorrhage took place into the huge cavity formed by the parasite, this was, at the post mortem examination found full of blood, but no blood had been expectorated immediately before death. It was, indeed, a case of concealed hæmorrhage.

Another fatal case arose from the erosion of a pulmonary varix.‡

In another case, the hæmorrhages were so profuse and frequently repeated, that "the patient became in the highest degree anæmic and debilitated," and ultimately died.§

Pneumonia occurred in three cases. Once in the same lung as the parasite, and once in the opposite one. In the third case this point is not mentioned.

Gangrene occurred in five cases.

Twice the walls of the hydatid sac were gangrenous. Once the walls of the sac and the adjacent lung parenchyma.

Once there was gangrene of both lungs, with a hydatid at the base of the left lung.

Once gangrene in one lung, and a hydatid on the opposite side.

From these facts it may be concluded, that gangrene of the lung may be a sequel, or merely an epiphenomenon in cases of Pulmonary Hydatid.

* Path. Soc. Trans., vol. xi., p. 299.

† S. A. Branch Bri. Med. Asso., September, 1883.

‡ Habershon. Guy's Hospital Reports.

Wolff. Inaugural Dissertation, Breslau, 1869, p. 15.

Impediment to Respiration (asphyxia, slow or rapid) in 16 cases, seemed to be the immediate cause of death.

In six instances slow asphyxia resulted from the mere size of the unruptured cysts.

In two instances death rapidly supervened from impaction of membranes in the air passages, and in three cases the fatal event was apparently caused by the flooding of the Bronchial tracts of both lungs by hydatid fluid.

THE SURGICAL TREATMENT OF PULMONARY HYDATIDS.

From what has been already stated, it is evident that the prospects of a patient who relies upon the *vis medicatrix naturæ* are by no means so bright as to forbid the hope that they may be improved by the intervention of art.

I do not think that any good would result from the discussion of treatment by drugs, for beyond improving the general health and checking the violence of cough, drugs are, in my opinion, simply useless, if not hurtful. So that the curative treatment of pulmonary hydatids is a question of surgery.

Now, it will be conceded that the mere death of the parasite may in many cases result in the cure of the "host;" but this is by no means always the case, for the parasite dead, may prove even a greater source of immediate peril than the parasite alive does, consequently I shall consider the surgical treatment of the disease, under two headings, viz.:—

1st. Without artificial removal of the parasite.

2nd. By Radical treatment; which involves the removal of the entire parasite.

OPERATIONS BY PUNCTURE, ASPIRATORY, OR SIMPLE, WITHOUT REMOVAL OF THE MOTHER CYST.

Many such operations have been performed, especially in Australia, and more particularly in Victoria.

Up to the present time I have succeeded in collecting only 26 such cases, they are tabulated by me into two groups, *i.e.*—Deaths and Recoveries. The last group contains some cases, the ultimate result of which was uncertain.

CASES OF PULMONARY HYDATIDS TREATED BY PUNCTURE.—DEATHS.

No.	Reference.	Sex.	Age.	Name and Occupation	Situation of Cyst.	Operation.	Remarks.	Result.
1	Caron and Soubeiran. Gaz. Méd. de Paris, 1853. Cited also by Hearn.	M.	36	—	Right pleura; size of head of child aged 10 years.	Punctured at "point of election," two or three ozs. of limpid serosity escaped.	A violent attack of suffocative dyspnoea followed the puncture.	Death five days after operation, with symptoms of extreme venous congestion of the head, neck, and right arm.
2	Dunn. Aust Med. Jour., 1863, p. 23.	M.	37	H.P. Gold-digger, Victoria.	Large cavity in Right lung, extending into thick edge of liver. Diaphragm absorbed.	Puncture, with fine trocar; 72 oz of hydatid fluid removed. One month later patient returned with dyspnoea, pain in the side, &c. Second tapping—3 pints of pus and some hydatid shreds	Two days after second operation, severe cough and copious expectoration of pus. Gradually sank.	Death four days after the second puncture.
3	MacGillivray. Aust. Med. Jour., 1867, p. 74.	M.	63	Native of British India, Miner.	Large hydatid, occupying the greater part of the Right lung, "the only sound part of which was at the apex."	Puncture with fine trocar; 52 ozs. of clear hydatid fluid; relief for a fortnight, then dyspnoea, cough, stinking expectoration. Exploratory puncture in several places brought away only a little blood.	Contents of cyst thick and viscid, and contained two or three moderate-sized daughter-cysts, and a very few small ones.	Died "rather suddenly," about a month after the first puncture.
4	Frœntzel. Charité-Annalen, 1876. Also Virchow and Hirsch, Jahresbericht, vol. xii., part I, p. 142.	—	—	—	In the Left lung a hydatid, of the size of a man's head. In the Right lung a rather smaller one.	A puncture was made during life, but only 100 cubic centimetres of bloody serous (pleuritic?) fluid were obtained.	Diagnosis not made during life. The lung tissue in the neighbourhood of the cysts was in part breaking down by suppuration.	Death.

5	Broadbent, Lancet, 1878 p. 575.	F.	19	—	Greater part of Right lung.	Aspirator needle inserted, in order to relieve possible tension. Only a few drops of bloody fluid removed.	The symptoms closely simulated pneumo- thorax. No doubt the cyst had ruptured before puncture.	Death.
6	Allen, Aust. Med. Jour., 1881, p. 198.	M.	56	J.G. Labourer	Large hydatid in the lower lobe of the Right lung; also, another in the liver, pressing on the duct of the gall-bladder.	"Paracentesis performed in the lower axillary region, between the ninth and tenth ribs. Bloody fluid in small quantities evacuated."	The symptoms present were principally due to the liver cyst, <i>e.g.</i> Jaundice, Edema of legs, &c.	Death.
7	Communicated to author by Dr. Lonsdale Holden, Hobart Hospital.	M.	23	G.G.	Cavity in the middle of the Right lung, of over a pint in capacity. It contained a large collapsed cyst, and a small one not rup- tured.	Aspiratory puncture with a small needle; but it was doubtful whether any fluid at all was removed.	Patient died in about five minutes after puncture, apparently from fluid in the air- tracts of both lungs.	Death rapidly took place, with symptoms of asphyxia.
8	Seen by the author in conjunction with Dr. Verco, Ade- laide, 1884.	F.	20	Mrs. C.	Hydatid at apex of Right lung.	Fine aspirator needle gave clear fluid, only about half an oz. allowed to escape, for it was intended to per- form Radical operation. About two months later, cyst had refilled; large trochar inserted in the outer part of the second interspace in front.	Symptoms of pneumo - thorax occurred after both operations. On last occasion fatal. No autopsy made.	Death.
9	Dr. Shields, Aust. Med. Jour., 1884, p. 360. Under the care of Dr. Wil- liams in the Melbourne Hospital.	F.	23	M.R.	Huge cyst, appa- rently of basic origin, occupying almost the entire Right lung.	Exploratory puncture fol- lowed immediately by use of a trochar in the axillary line, about the sixth inter- space. Three pints of clear Hydatid fluid removed.	Cough; pyrexia, severe dyspnoea, &c., came on after the opera- tion. Respiration be- came shallow and hur- ried, pulse weak, and the patient sank.	Death on the fifth day after puncture.

CASES OF PULMONARY HYDATIDS TREATED BY PUNCTURE.—CURES, ETC.

No.	Reference.	Sex.	Age.	Name and Occupation.	Situation of Hydatid.	Operation.	Remarks.	Result.
1	Brugnon. Cited by Val- leix, Davaine, and Hearn.	M.	A "man."	—	In the Left Lung.	A seton needle was introduced between the fifth and sixth ribs, this was replaced by a gum-elastic "sound."	At first seven pounds of serosity escaped, and the flow continued for several days. Finally, many small globular hydatids.	A fortnight after the operation the patient was able to take a journey of several miles.
2	Babbington. Guy's Hosp. Rep., 1841.	M.	19	H.S.	In Right Lung.	Puncture with a fine trochar. One and a half pints of purulent fluid removed.	Shortly after puncture the patient was taken with a paroxysm of cough and dyspnoea	Recovery, after some months of expectoration of pus and hydatids.
3	Vigla (1853) Archives G�n�- rales de M�d�- cine, Sept., 1855.	M.	32	Constant R., cattle drover.	Large Hydatid in Right Lung.	M. Monod punctured with a trochar between the sixth and seventh right ribs. A large quantity of clear hydatid fluid escaped. 250 grammes of a solution of Iodine and Iodide of Potassium were then injected, about half of which was withdrawn some minutes afterwards.	No unpleasant symptoms followed the operation.	Complete recovery. Patient well one year later.
4	Hughes (Guy's Hosp.) Lancet, 1856, vol. ii, p. 399.	M.	36	An Italian in Guy's Hospital, 1856.	Lung or Pleura.	Tapped by Mr. Birkett, on April 28th, 1856. Hydatid fluid was removed.	The wound was healed up next day.	Not recorded.
5	Atkinson. Aust. Med. Jour., 1867, p. 290.	—	—	—	In upper part of Left Lung.	"Tapped high up in the chest."	"Severe symptoms of aneurism of the aorta were simulated."	"The patient made a fair recovery, though tedious."
6	MacGillivray. Aust. Med. Jour., 1865, p. 249.	M.	38	Joseph D. miner.	In upper part of Left Lung.	Mr. Cheyne punctured with a fine trochar, between the third and fourth ribs. About a pint of clear hydatid fluid removed.	Coughed up hydatids and had severe h�moptysis after operation. "Since then he has been much relieved."	Relieved.

7	MacGillivray. Aust. Med. Jour., 1872. Table on page 214.	F.	11	Daughter of a miner.	—	Tapped with fine trochar.	—	Cure.
8	MacMillan. Aust. Med. Jour., 1873, p. 297.	—	—	—	—	Puncture.	Immediately after puncture rupture took place into a Bronchial tube (attributed to accidental puncture of a Bronchial tube.)	Not stated.
9	Bird. Med. Aust. Jour., 1871.	F.	Young	—	In upper lobe of Left Lung.	Punctured.	—	Cured.
10	Bird. Med. Aust. Jour., 1871.	F.	9	E.G., farmer's daughter.	In upper lobe of Left Lung.	Aspiratory puncture. After- wards administration of Kamala and Bromide of Potassium.	Six months previ- ously a large liver hydatid had been punc- tured by Dr. Bird.	Cured.
11	Bird. Med. Aust. Jour., 1873.	F.	19	J.N., domestic servant.	In upper lobe of Left Lung.	Punctured below the clavicle, after six ounces of fluid had escaped, rupture occurred into a Bronchus.	Dr. Bird thought that he had punctured a Bronchus, and thus caused the expectora- tion of hydatid con- tents.	Recovery, after seven months.
12	Bird.	M.	38	—	Large Hydatid in Left Lung.	Puncture between fourth and fifth ribs. After escape of a few ounces of fluid, violent asphyxial symptoms.	Pneumo-thorax fol- lowed the operation. Dr. Bird thought he had punctured a bron- chus.	Recovery within a few weeks.
13	J. Davies Thomas. Unpublished.	M.	37	G.D., farmer.	Base of Right Lung.	Afterwards aspiratory puncture by Mr. Ellison; one-and-a-half pints of clear fluid removed.	—	Unknown.

CASES OF PULMONARY HYDATIDS TREATED BY PUNCTURE.—CURES, ETC.—(CONTINUED.)

No.	Reference.	Sex.	Age.	Name and Occupation	Situation of Hydatid.	Operation.	Remarks.	Result.
14	J. Davies Thomas. Med. Times and Gaz., 1881 p. 65.	M.	38	H.P., labourer.	Lower lobe of Left Lung.	Aspiratory puncture in eighth interspace posteriorly: 18 ounces of clear hydatid fluid removed.	Ten hours after operation, rupture into a bronchus, cough and expectoration of membranes for several months.	Recovery complete.
15	Dr. Hayward, of Adelaide, and J. Davies Thomas.	M.	32	J.H., farmer.	Left posterior and lateral base.	Aspiratory puncture in seventh space posteriorly, behind angle of scapula; four ounces of clear hydatid fluid removed.	At the time of the operation about a quart of frothy fluid was coughed up, and expectoration of cyst-wall took place for a considerable period.	Ultimately recovery complete.
16	J. Davies Thomas. Unpublished.	M.	18	F.L.J.	Lower lobe of Right Lung.	Aspiratory puncture in eighth space, four inches from spine (axillary region); 11 ounces of clear hydatid fluid removed.	At the end of the operation, gas came through the needle, and at once severe paroxysmal cough with expectoration of thin rusty fluid occurred.	Recovery nearly complete in a few months.
17	Dr. Verco. Adelaide Hospital. Unpublished, 1882.	F.	15	E.B., domestic servant.	Lower part of Right Lung, below the third rib.	Aspiratory puncture in the seventh interspace axillary line; 65 ounces of clear hydatid fluid removed.	Some dry cough followed the puncture.	Cured or relieved.

It must be admitted that this small number of cases of operations by puncture, is inadequate to justify us in forming an exact estimate of the value of this plan of treatment, and it is unfortunate that medical men who have largely practised this mode of operation on pulmonary cysts have not published detailed accounts of the results obtained. The majority of Victorian physicians, with whose views upon this point I am acquainted, either personally or by their writings, hold this mode of treatment in high esteem. However, something may be learnt by the study of the twenty-six cases before us.

In nine instances death occurred ; in seventeen recovery took place, or the ultimate result was unknown.

As regards the fatal cases—Twice the cyst seems to have burst into the bronchial tract before puncture, and consequently scarcely any fluid was removed by the operation. In these cases the treatment had no appreciable influence upon the state of the patient.

In one case (No. 4) it is not clear whether or not the cyst was touched, for it is stated that only 100 cc. of bloody serous (pleuritic?) fluid were removed.

In the remaining six cases the unruptured parasite was punctured.

In Nos. 2, 3, and 9, a small trochar was employed, and a large quantity of clear hydatid fluid was removed.

In No. 2, a second tapping was performed a month after the first one, and three pints of pus and shreds of hydatid membrane were taken away. The patient died four days after the second operation.

In Case 6, the death was apparently connected with a liver cyst, which caused jaundice, œdema of the legs, &c.

In Nos. 1 and 6, immediately after the puncture, severe dyspnoea, with cough and profuse expectoration set in.

In the last-named case, death took place within five minutes. It seems to me that the patient died from suffocation, due to the flooding of both his lungs by hydatid fluid forced out rapidly by the elasticity of the cyst-wall, and not sufficiently quickly expelled by coughing efforts. This case is recorded at greater length in a later part of this work.

It is worthy of note, that in both these cases the cyst was found at the post-mortem examination to be of large size, and collapsed, yet during the operation very little fluid was removed through the instrument. In No. 1, the cyst was described as being of the size of the head of a ten years' old child, and yet only "two or three ounces of limpid serosity" were taken away by the puncture.

In case No. 6, the cyst was of over a pint in capacity, and yet it was doubtful whether any fluid at all was removed by the puncture.

In order to prevent repetition, I may here point out that the physical conditions of pulmonary hydatids differ in many respects from those present in liver hydatid. For example :—

In the case of the liver cyst, it is comparatively rare for free communication to exist between a moderately large hepatic duct, and the interior of the cavity enclosing the parasite ; but in the case of a large or moderately large pulmonary hydatid, it is almost certain that in most cases there will be very free communication with one or more bronchial tubes. Suppose now, that a long needle be used to puncture the cyst, and that it becomes blocked by a daughter-cyst. Very little fluid can then be removed through the instrument, and it is withdrawn. Immediately upon its withdrawal the contents of the cyst are to a greater or less extent, forcibly ejected into the cavern in the lung, and the mother-cyst collapses. If then the bronchial outlet is so placed, that it is not blocked up by the collapsed cyst, at once a great quantity of watery fluid is poured into the bronchial tract, almost immediately the patient has to inspire air, the fluid is then sucked back into the air-tubes of both lungs, and violent or even fatal dyspnoea, with cough and expectoration, will occur. Even before the removal of the instrument, the mother-cyst may collapse, so that the inner end of the trochar may be outside the parasite, although inside the enveloping cavity.

I have witnessed extreme peril from this cause in a patient operated on by myself ; the case will be referred to in conjunction with the discussion of Radical operations.

In seven out of the seventeen recoveries also, this phenomenon of rupture into a bronchus occurred, viz. : — In Nos. 2, 6, 8, 11, 12, 14, 15, and 16. In most cases it occurred at the time of operation, but in others, perhaps not for some hours, or even days after the operation. These variations are, no doubt, dependent upon whether the bronchial inlets of the cavity happen to be blocked up by the mother-cyst or are patent ; at one time they may be closed, and at another open, owing to changes in the precise position of the collapsed parasite.

Dr. Dougan Bird, in alluding to the violent cough and dyspnoea sometimes caused by puncture of the cyst, explains their occurrence by supposing, that a bronchial tube is then accidentally punctured by the trochar ; he remarks* upon this point. “The other complication in the operation is sufficiently alarming, though rarely met with. This is the unavoidable piercing of a small bronchus, by the stylet, in its passage, through the condensed layer of lung-tissue. At first, all goes on as usual, and the fluid flows freely through the trochar ; but as the pressure is removed, the bronchus becomes pervious, and violent paroxysmal cough comes on.”

For several reasons I am unable to accept this, as a satisfactory explanation of the symptoms.

In the first place, it is evident that so long as the trochar remains in the

* Hydatids of the Lungs ; second edition, p. 34.

lung, it must effectually plug any small bronchial tube that it might happen to traverse on its course into the cavity, and yet it often happens that the cough and dyspnœa come on *before* the instrument is removed, and consequently before any perforated bronchus could be opened to receive the fluid.

In the second place, it usually happens that before a pulmonary cyst is punctured, the portion of lung-tissue to be traversed by the instrument is as completely devoid of patent bronchial tubes as a piece of sole-leather, in fact, the only permeable bronchi are situated between the cyst and the root of the lung [except, of course, in parts of the lung not invaded by the parasite.]

I have witnessed extreme dyspnœa in a case, where the post-mortem examination showed a total absence of all trace of bronchial tubes at the place of puncture.

It seems to me, that the symptoms in question are more readily explicable by the theory advanced by me; moreover, certain acoustic phenomena found in conjunction with hydatid cavities in the lungs are explained in a similar manner.

In regard to the cases of Cure or Recovery after puncture, it is clear that in six at least, and perhaps more cases, the cure really resulted from the expectoration of the hydatid by natural efforts, after its rupture by surgical interference.

However, there can be no doubt that in some instances simple puncture of the parasite causes its death, and that the animal afterwards undergoes degeneration, and ceases to trouble the patient.

It is astonishing how complete the recovery may be in some cases, even when a large cyst has been present.

For example, I punctured an hydatid in the left lung of a man in 1876. At that time eighteen ounces of hydatid fluid were removed, but rupture into a bronchus followed ten hours later. During several months he coughed and expectorated pus, hydatid membranes, and blood, and ultimately recovered completely.

In August, 1882, *i.e.*, six years after his hydatid illness, he passed successfully through a severe attack of double pneumonia. No trace of his old disease seemed to be left.

THE RADICAL TREATMENT OF PULMONARY HYDATID.

It has already been made clear that the treatment by simple puncture is by no means devoid of immediate risk; also, that in many cases it fails to cure the disease. When the latter happens it is due to the fact, that although the parasite is dead, yet its remains continue to a greater or less extent to occupy the cavity, which originally harboured the living bladder-worm. This, then, acts as a decomposing foreign body, and causes suppuration in the sac, and induces a form of septicæmic poisoning with pyrexia, emaciation, night sweats, &c., and ultimately, unless the cyst-

fragments be expelled from the body by coughing efforts, or by surgical interference, death usually results.

Of course it is not denied, that in some cases puncture and removal of the fluid contents of the parasite result in the perfect recovery of the host ; but in a large proportion of instances this is not so.

The question then naturally arises, why a foreign body, situated in a cavity in the lungs, should not be subjected to the same treatment, as is habitually adopted under like conditions elsewhere. The tacit reply has always been—that wounds of the lungs are notoriously perilous from their tendency to cause hæmorrhage, and to be followed by various dangerous secondary lesions, such as pneumo-thorax, empyema, parenchymatous inflammation of the wounded lung, emphysema, &c.; but of late years there has been an increasing disposition to treat cavities in the lungs by surgical means.

Naturally, the most common cavity, *i.e.*, the Phthisical one, would be first attempted. In several instances phthisical cavities have been treated by free drainage.

For example, there was treated in St. George's Hospital* in the year 1879, a case which had been drafted into that institution from University College Hospital. This patient had been operated on by Mr. Christopher Heath, who had inserted a tube into a cavity, situated at the base of the left lung. The patient died, and at the post-mortem examination, the cavity was found to be bounded by the lung above, by the pleura and pericardium laterally, and by the diaphragm below ; but there was clear evidence in the ragged character of the roof of the cavity, to show that it was a pulmonary vomica, not a localised empyema, and yet—"It is worthy of note that this large cavity, although situated at the lower part of the lung, in the situation most adapted for successful drainage, had been tapped, and kept empty, without affording protection to the rest of the lung against the infection of Phthisis."

The last remark really sums up the evidence, as for or against the attempt to drain phthisical cavities. When surgically successful it is medically useless.

Among other cases in which phthisical cavities have been drained artificially, may be mentioned, one recorded by Dr. C. Theodore Williams, in the Clinical Society's Transactions for 1879 ;† another by Dr. Sadler.‡ Two others by Dr. A. D. Leith Napier.§ One read before the Royal Medical and Chirurgical Society, by Dr. Douglas Powell and Mr. R. W.

* St. George's Hosp. Rep., vol. x., p. 301.

† Vol. xii., p. 47.

‡ Lancet, 1879 ; vol. i., p. 84.

§ Lancet, 1878 ; vol. ii., p. 727.

Lyell, and another brought before the notice of the same Society in May, 1884,|| by Dr. Cecil Y. Biss.

The subject of drainage of pulmonary cavities has been discussed by the Royal Medical and Chirurgical Society on two occasions. A very able paper on the same subject, was published by Drs. Fenger and Hollister, in the American Journal of the Medical Sciences, of October, 1881.

The last-named writers allude to some of the cases already mentioned by me, and record a case of their own, where a ruptured pulmonary hydatid was successfully treated by them, the Radical operation being performed. (See Case 16, in the Table of Successful Radical Operations.)

Cases of Phthisical cavities treated in this mode have not shown very encouraging results, but the treatment has been far more satisfactory when applied to pulmonary cavities produced by Gangrene or Abscess.

Dr. Cayley and Mr. Pearce Gould* have recorded a case of Gangrene of lung treated by free incision and drainage, where the patient made a good recovery ; and Mr. Pridgin Teale† has recently reported an equally gratifying termination to a case of Abscess of the lung.

It would be irrelevant here to discuss the general question of Incision and Drainage of pulmonary cavities, but it seems to be safe to conclude that—

1st. In cases of Phthisical vomicae, the operation, even if surgically successful, cannot be expected to permanently benefit the patient.

2nd. In cavities produced by Pulmonary Gangrene, the operation is not only permissible, but even advisable.

3rd. That Simple Abscesses of the lung should always be drained.

4th. As regards the Cavities produced by Hydatid Cysts, attention is now invited to the evidence adduced by thirty such cases tabulated hereafter :—

Of these twenty-three are Australian, three English, two French, one German, and one American.

* Lancet, May 31st, 1884.

† Lancet, July 5, 1884.

|| Lancet, May 31, 1884 ; p. 982.

CASES OF PULMONARY HYDATID TREATED BY RADICAL OPERATION.—DEATHS.

No.	Reference.	Sex.	Age.	Name and Occupation.	Situation of Hydatid.	Operation.	Remarks.	Result.
1	Mr. Charles Williams. Lancet, 1864. Vol. ii., p. 632.	M.	25	Farm labourer.	Left pleural cavity, also two collapsed hydatids in the liver.	What appeared to be an abscess on the left side of the chest was freely incised. A wash-basinful of pus and hydatid cysts escaped.	Air escaped freely through the opening, and the patient spat up pus and hydatid cysts.	Death from exhaustion.
2	Bird, Dr. D. Aust. Med. Jour., 1871.	F.	—	—	An enormous hydatid in the Left lung.	Puncture with trochar, followed by incision in the fourth interspace. Cyst and pus escaped.	Great improvement, but the wound contracted, so as to hinder discharge. Cough returned. The patient refused further operation.	Death.
3	Bird. Med. Aust. Jour., 1881, p. 171.	F.	26	Mrs. G.	At lower part of Right Pleura apparently.	Puncture, with trochar, in seventh intercostal space; three points of semi-purulent fluid containing hooklets, were removed, but very little relief resulted. Ten days later, incision in the seventh interspace. Decomposing ruptured hydatid removed with great relief.	About a fortnight after the incision dyspnoea and oppression of the chest came on, and during the exploration of the cavity, with a gum-elastic catheter, a second hydatid was ruptured, and about ten ounces of clear hydatid fluid escaped. Relief again resulted, but symptoms of cardiac trouble came on, and the patient died.	Death.

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4	H. B. Allen. Aust. Med. Jour., 1881, p. 193. Treated in the Mel- bourne Hos- pital by Mr. Fitzgerald.	M.	41	J.P., miner.	In lower lobe of Right lung a large hydatid cyst, containing foetid pus, and broken mem- branes, the remainder of the lung solid and airless.	Trochar inserted, and drainage tube introduced. Afterwards wound enlarged, to give free exit to discharge.	In this case the hyda- tid membranes were not completely evacu- ated by the operation.	Died a few days after the operation.
5	J. Davies Thomas. (Unpublished case.)	M.	45	Peter S.	Practically, the entire Right lung replaced by a huge hydatid. Fully four-fifths of the total lung had disappeared.	Puncture with trochar, for ex- ploration, followed by incision in the fifth space, about one inch outside nipple line. Counter opening in ninth space, line of posterior axillary fold; large drainage tube passed through.	Mother cyst entirely removed at time of operation. Patient died 22nd day after operation, of septicæ- mia. Left pneumonia, pleurisy and pericar- ditis were found.	Death.

CASES OF PULMONARY HYDATIDS TREATED BY RADICAL OPERATION.—RECOVERIES.

No.	Reference.	Sex.	Age.	Name and Occupation.	Situation of Hydatid.	Operation.	Remarks.	Result.
1	Fréteau (1812) Jour. Gén. de Sédillot, tom. xliii. Cited by Cruveilhier, Davaine, Hearn, etc.	M.	28	—	Puffy swelling at the posterior and inferior part of the right chest, with maximum protrusion at the eleventh intercostal space. Fluctuation present, and on pressure the fluid could be caused to enter the chest; by coughing the soft tumour was reproduced.	Incision over the swelling—a hydatid cyst presented in the wound—this being opened, limpid fluid escaped, and afterwards a large quantity of yellow pus. Subsequently, escape of pus and hydatids from the wound.	Fifteen days after the operation copious expectoration of pus and hydatids. Many hydatids escaped afterwards, both by the wound and by expectoration.	Great improvement. Probably ultimate recovery.
2	Landau. für Archiv. für Gynaek. viii. Heft 2. Cited by Neisser, p. 115, No. 16.	F.	25	—	Tumour size of fist situated underneath the right breast, and attached to it, extended obliquely from fourth rib to margin of thorax.	Incision carried down to tumour, gave exit to 400 grammes of clear amber-yellow fluid, with 30 to 40 hydatid cysts; afterwards free discharge of cysts, pus, and shreds of connective tissue.	The Hydatid had eroded the ribs, and destroyed the intercostal muscles where it projected. Cough continued after the operation.	Recovery after profuse suppuration, escape of cysts, &c., for some months.
3	Southey. Barth. Hosp. Rep. 1867, vol. iii., p. 394.	F.	31	Mrs. B.	Very large hydatid in the Right Lung. Marked bulging on right side of spine, posteriorly, caused displacement of lower angle of right scapula.	After four months palliative treatment, tapped; 132 ounces of puriform serous fluid removed. Trochar left in, but escaped after a couple of days, was replaced by a tracheotomy tube, in about a fortnight decomposition of the contents of the cavity set in with pyrexia, &c. Then free incision in sixth interspace, on lateral aspect of chest. Cyst size of pig's bladder removed.	Some difficulty in ensuring sufficient drainage after the incision. No drainage tube employed. Dr. Southey regarded the cyst as pleural. It certainly lay above the diaphragm.	Recovery complete three months after the operation.

		F.	27	Julia K., governess	Large Hydatid in Right lung.	Large trochar inserted below angle of scapula, upwards of two pints of pus withdrawn. Chest twice subsequently opened, and ultimately a large catheter kept in. Cysts escaped in considerable numbers. Cavity washed out with a double catheter. Warm water used, and afterwards a weak sul- phate of zinc injection.	Recovery. Small sinus left at last report.
4	MacGillivray Aust. Med. Jour., March, 1867, p. 70.						
5	Montard- Martin. Gaz., Hébdom, 1871. Cited by Hearn, No. 127.	M.	17	—	Right side of chest; evidently large cyst, very noticeable bulg- ing of right chest. Probably a pleural cyst.	Fine trochar used, no fluid re- moved, afterwards Dieulafoy's aspirator tried, but only 20 grammes of pus procured. Inci- sion gave exit to much pus and numerous hydatids, afterwards injections of alcoholised water were used.	At time of last report making good progress towards recovery.
6	Blair. Med. Aust. Jour., 1875, p. 144.	F.	About 35	M.B.	Lower part of Right Lung principally in front.	Three tapplings in two months. The last occasion a trochar of the diameter of No. 7 catheter tied in. 112 ounces of pus and daughter- cysts escaped: 15 days later, inci- sion in the eighth intercostal space	Recovery complete about ten weeks after incision.
7	Dr. D. Bird. Aust. Med. Jour., 1875, p. 304.	M.	38	J.C., Alfred Hospital, Melbourne 1874.	Side not mentioned. Cyst of very large size, 144 ounces of fluid were removed at first tapping. [Right Lung.*]	Tapped, and parent cyst removed entire, by dilatation and incision. Cyst extracted entire or nearly so.	Died of erysipelas and abscess of lung.
8	Do. do. Dr. Barrett's patient.	F.	22	J.S., Alfred Hos., 1874.	Lung locality not mentioned. [Left Lung*]	"Parent cyst extracted" entire, or nearly so.	Cured.
9	Do. do. Dr. Barrett's case.	F.	33	M.B., Alfred Hos., 1874.	Lung locality not men- tioned. [Right side.*]	"Parent cyst extracted" entire, or nearly so.	Cured.
10	Dr. Bird, loco cit. Dr. Bird's case.	F.	21	M.H., Alfred Hos., 74-5	Lung locality not men- tioned. [Right Lung.*]	Tapped and incised. Cyst came away piecemeal.	Cured.

* The exact locality of these cysts is mentioned in Dr. Bird's book on "Hydatids of the Lung;" second edition.

CASES OF PULMONARY HYDATIDS TREATED BY RADICAL OPERATION.—RECOVERIES—(CONTINUED).

No.	Reference.	Sex.	Age.	Name and Occupation.	Situation of Hydatid.	Operation.	Remarks.	Result.
11	Dr. Bird, lococit. Dr. Barrett's case.	F.	11	A.E.R. Alfd. Hos. 1874-5.	Lung; locality not mentioned. [Left Lung.*]	Tapped and incised. Cyst came away piecemeal.	In Hospital 62 days.	Cured.
12	Do. do. Dr. Bird's case.	F.	22	E.M.L., Alfd. Hos. 1875.	[Right lung.*]	Do. do.	Cyst of enormous size. "The patient was so near death from syncope and pressure, that she had to be carried on her bed in a furniture van, straight from her home to the Hospital." In Hospital 44 days.	Cured.
13	Do. do. Dr. Bird's case.	M.	12	C.O'D., Alfd. Hos. 1875.	[Right Lung.*]	Do. do.	In Hospital 69 days.	Cured.
14	Dr. D. Bird, Aust. Med. Jour., 1881, p. 173.	F.	9	—	Side of chest not mentioned.	Large trochar inserted in fifth intercostal space. Two days later, incision and removal of cyst.	Had had sores in consequence of being unable to breathe, except in one posture.	Recovery complete within a month.
15	Dr. D. Bird, Aust. Med. Jour., April 15, 1884.	M.	Adult.	—	Lower part of the Right Lung in front.	Large trochar inserted in fifth interspace. Afterwards incision and antiseptic injections for three weeks.	The patient had clubbed finger-ends, which gradually disappeared during the treatment.	Cured. One month.
16	Fenger & Holister. The American Journal of the Medical Sciences, Oct. 1881, p. 371.	M.	34	Francesco Caputo, an Italian labourer.	Middle of Right Lung.	Incision in third interspace in front. Counter opening in fifth interspace. Injection of sac, and immediate removal of cyst.	Physical signs in the chest considerably modified by changes of posture.	Cured; 102 days.

17	F. W. Baily, Proceedings of S. A. Branch of the British Med. Asso., July 29, 1881.	M.	15	Louis F., Adelaide.	Posterior base of Right Lung.	Incision between ninth and tenth ribs, posteriorly; also, at same time, between seventh and eighth ribs, and counter-opening in front, between fifth and sixth ribs, just outside the nipple. Drainage- tube passed through chest.	The nails became clubbed during the treatment.	Cured; but sinus left at last report.
18	F. W. Baily. See Case 17.	F.	10	Catherine B., Adelaide.	Posterior base of the Right Lung.	Incision in the fifth interspace, just outside the nipple. Counter- opening at back.	—	Progressing favour- ably at time of report.
19	J. Davies Thomas. Unpublished.	M.	30	Thomas E., teamster, 1883-84. Adelaide Hospital.	Base of Right Lung.	Incision in eighth interspace, right scapular line, followed by forcible dilatation by forceps. Immediate removal of mother- cyst, drainage tube inserted.	Case of cyst ruptured into bronchial tube. Cough ceased after the removal of the parasite.	Recovery rapid and complete.
20	Do. do.	M.	14	A. E. B., 1884, Ade- laide Hos.	Upper lobe of Right Lung.	Incision in the fifth right inter- space, mid-axillary line. Forcible dilatation of lung wound, with forceps. Immediate removal of mother-cyst. Drainage-tube inserted.	Cyst had previously ruptured into bron- chial tract. Cough ceased after the re- moval of the parasite.	Recovery rapid (under two months.)
21	Do. do.	M.	21	John T., farmer & butcher, Adelaide Hospital, 1883-84.	In lower part of Right chest in front, probably Pleural, but the dulness was con- tinuous with that of the Liver below.	Puncture in fourth interspace, just inside the right nipple line, was followed by signs of pneumo- thorax and fluid at the base. In- cision in tenth interspace, poste- riorly. Subsequent escape of mother-cyst. Drainage-tube in- serted and kept in.	Patient in very criti- cal condition before escape of cyst. Rapid improvement after- wards. Cyst not rup- tured before puncture.	Recovery complete.
22	Do. do.	F.	35	Harriet H., housewife, Adelaide Hospital, 1884.	Upper lobe of Left Lung.	Punctured some months before admission. Incision in fourth Left space, about mid-axillary line. Immediate removal of cyst.	Cyst punctured and rupture into bronchus before admission; strong suspicions of Phthisis in Right Lung. Rapid improvement after removal of cyst.	Fair recovery. Sinus closed, &c., but still slight cough and occa- sional hemoptysis. General health good.

* The exact locality of these cysts is mentioned in Dr. Bird's book on "Hydatids of the Lung;" second edition.

CASES OF PULMONARY HYDATIDS TREATED BY RADICAL OPERATION.—RECOVERIES—(CONTINUED).

No.	Reference.	Sex.	Age.	Name and Occupation.	Situation of Hydatid.	Operation.	Remarks.	Result.
23	Dr. Verco. Unpublished.	F.	13	Emily S. Adelaide Hospital, 1882.	Lower part of Left Lung, chiefly in front.	Exploratory puncture. Incision in eighth interspace, axillary re- gion. Pus and debris of hydatids discharged.	This patient was seen by me (J. D. T.) in August, 1884, she then appeared to be in good health.	Cured.
24	H. T. Groom, Esq. Lancet, 1884, vol. i., p. 846.	F.	15	Lydia B.	Large Hydatid in Right Lung.	Three weeks before admission, three pints of fluid removed by aspiration. Incision 1½ inches long in the sixth interspace, axil- lary region. Much fluid, and many daughter-cysts discharged.	Diagnosis of Em- pyema.	Recovery; but 18 months afterwards, still a fistula discharg- ing pus.
25	Dr. Isaiah de Zouche. Aust. Med. Jour., 1883, p. 9.	F.	13½	Florence W., Dun- edin Hosp.	Patient wasted, and anæmic. At the first glance looked like a case of Phthisis. Dul- ness over lower part of Right Lung, front and back, "the line of dulness in front was altered by change of position." Sputa copious, frothy, and semi-purulent, with disagreeable smell as they came up.	Exploratory puncture with hydro- dermic needle in seventh inter- space, between the axillary lines, drew off stinking pus. Incision in seventh intercostal space. Pus, followed by a hydatid cyst as large as a cocoa-nut, escaped. Operation under antiseptic pre- cautions. Injections of Iodine and Permanganate of potash tried but given up in consequence of their causing severe cough. Drain- age-tube kept in.	Diagnosis of Empe- ma. Great dyspnea during operation "purulent and bloody sputa coughed up in great quantity." "She was gasping for breath and seemed in immi- nent danger of death."	Cure. Drainage- tube removed on 52nd day. Left the Hos- pital on 66th day, but fit to leave three weeks earlier.

General Result.—

Twenty-five recovered and five died.

Age of Patients.—

The youngest was a patient of Dr. Dougan Bird, a girl, aged 9, successful ; the eldest, a patient of my own, a man, aged 45, unsuccessful.

Ages of Patients.

1 to 10 years old	2 cases
11 to 20 „ „	8 „
21 to 30 „ „	10 „
31 to 40 „ „	6 „
41 to 50 „ „	2 „
Age not stated	2 „
	—
	30

Sex.—

Males.....	13		Females.....	17
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Side of Chest Affected.—

Right side	18 cases
Left side.....	4 „
Side not mentioned	8 „
	—
	30

In four cases the cysts were apparently pleural ; in seventeen apparently (in many of them certainly) pulmonary. The rest are doubtful.

As regards the *diagnosis* made before operation ; once it was regarded as abscess of chest wall, once as a deep-seated tumour connected with the breast, five times as empyema or pleuritic effusion.

Apparently a correct diagnosis was made in the majority of the cases.

Condition of the Cyst.

In the majority of the cases the parasite had already ruptured into a Bronchial tube.

Mode of Operation.—

Direct free incision into sac	15 cases
Small incision and forcible dilatation with finger and forceps.	13 „
Trochar followed by drainage tube.....	2 „
	—
	30

Cause of Death in the Fatal Cases.—

In Cases 1, 2, and 4, the fatal result was apparently due to imperfect drainage, permitting retention of putrid pus and cysts.

In No. 4 fatal case, it was known that a second parasite occupied the

same side of the chest, and symptoms of fatal cardiac oppression supervened ; no autopsy was permitted.

In No. 5, the patient, Peter S., aged 45, had an enormous hydatid of the right lung, this was freely incised, and a large counter opening was made, under antiseptic precautions, but the air entered so freely through the bronchial tubes, and the dressings became so rapidly saturated with discharge, that the huge cavity became septic, and its walls ultimately gangrenous. The patient died on the 22nd day, of septicæmia. P.M.—There were found pneumonia and pleurisy on the left side, and recent pericarditis.

SUMMARY.

What now are the practical conclusions to be drawn from the histories of the 56 cases of operation that I have collected ?

In the first place, I think that it will be universally conceded, that something ought to be done, at any rate, when an *unruptured* cyst is diagnosed or even suspected.

It seems to me, that when the cyst is of moderate size it should, without doubt, be punctured, and as it is important to withdraw the fluid contents of the parasite as completely and rapidly as possible through the instrument, in order to prevent the risk of suffocation ; the instrument employed should not be of too narrow calibre. Moreover, as the punctured cyst rapidly collapses, the trochar should be of good length and boldly inserted, with the view of (if possible) keeping its point inside the cavity of the hydatid vesicle, not merely inside the cavity of the lung.

Whether the simple trochar or a trochar connected with an aspirator, should be employed, is, I confess, uncertain to me. Dr. Dougan Bird, whose judgment and unusually large experience, entitle his opinion to great respect, is strongly opposed to the use of the aspirator in these cases. In an article, entitled "The Trochar in Thoracic Surgery,"* he expresses himself in these words :—

"Against the aspirator, as an adjunct to the trochar and canula in thoracic surgery, I have a prejudice, which I firmly believe to be well-founded. I have several times used it and seen it used ; but never could find that it was any improvement on the simpler method of trusting to natural atmospheric pressure when a vent is given to foreign fluid in the viscera. Theoretically, it is utterly opposed to what we know of both the statics and dynamics of the chest-cavity and its walls ; practically, I have seen it positively mischievous by forcible and sudden traction, at points which should only be acted upon gently and gradually, and by causing hæmorrhage, by removing atmospheric pressure from exposed blood-vessels in the walls of the cavities. Lastly, it is vicious in principle to the scientific practitioner, as it brings a force of unknown relative power to

* The Australian Medical Journal, 1875, p. 303.

bear on parts which are out of his sight, and of whose condition he cannot be absolutely cognisant."

WHEN SHOULD THE RADICAL OPERATION BE UNDERTAKEN IN
PULMONARY HYDATIDS ?

In the first place, is it advisable to attempt this severe mode of treatment when the cyst is *unruptured*, either spontaneously or by previous puncture or aspiration ?

This is a most difficult question to answer, but I must confess that my limited experience upon the point is not favourable to its adoption.

I have seen two cases, in which steps were taken to procure immediate or early removal of the parasite, when no rupture into the bronchus had taken place.

One of these was that of Mrs. C., a young married lady, aged 20, whom I was permitted to see, in consultation, by Dr. Verco.

A moderate sized unruptured hydatid was diagnosed in the upper lobe of the right lung at the apex. An exploratory puncture was made by the aspirator, in order to confirm or correct the diagnosis, but as we agreed to perform Radical operation, only about half an ounce of the clear fluid contents of the cyst was withdrawn. Evidently, however, the greater part of the fluid afterwards escaped into the pleural cavity, for urticaria, pyrexia, and various physical signs indicated that this had taken place.

However, these phenomena soon disappeared, and the original physical signs returned, and about a month after the exploratory puncture, we punctured the parasite with a large trochar, inserted deeply into the second interspace.

The fluid this time was nearly clear, but stained with blood in small quantity. The canula used was three inches long, and the distal wall of the cavity could be probed by a gum-elastic bougie, at a depth of four-and-a-half inches.

I regret to state, that this patient died a few days after the operation, apparently from pneumo-thorax, for the canula appears to have been forced out of the cavity by the efforts of coughing.

No post-mortem examination was made, but I think that the fatal result was caused in the way I have suggested.

Had there existed adhesion between the visceral and parietal pleuræ at the spot, the ending would, no doubt, have been very different, and if the canula had not left the cavity in the lung for three or four days, adhesions would have formed. When a similar case comes under my care in future, I shall certainly content myself with the use of a small trochar, until a decided suppurative action takes place in the cyst-cavity ; the local inflammation resulting from this may fairly be expected to extend to the adjacent part of the surface of the lung, and thus cause adhesions to form.

The second (and indeed the only other) case in which I have seen death

follow Radical operation, was that of Peter S. As the complete history of this patient is recorded at the end of this paper, I need only remark that I do not think any other mode of treatment would have been more successful than the one adopted.

At present I must say, that I should not feel disposed to perform the Radical operation upon *small or moderate-sized unruptured cysts*, but that I would merely tap them at least once; but that when the cyst is very large, I should choose Radical measures (in spite of the unfortunate result of the two cases mentioned) inasmuch as the risk of suffocation is very great when simple puncture is employed, in consequence of the difficulty of evacuating the cyst rapidly enough, for long before it is empty a daughter-cyst, or the partially collapsed mother-cyst, is likely to stop the flow by obstructing the trochar; enough of fluid is then left to grievously imperil the patient, *i.e.*, if the collapsed cyst does not happen to occlude the bronchial inlet or inlets into the cavity.

I feel certain that Peter S. was only rescued from immediate death by the prompt establishment of a large opening in his chest wall.

But upon the question of the best treatment of *large unruptured hydatids*, I think that at present much difference of opinion will exist; and I confess that my own mind is not fully made up. It is emphatically a matter that can only be decided by the experience of many men and many cases.

However, I do not think that there can be any doubt that when we have a *large old ruptured cyst*, which has burst into the bronchial tract, and which has set up suppuration of the sac, and has produced most of the local and constitutional symptoms of a phthisical vomica, we ought to consider seriously the question of Radical operation.

The chief points that appear to me to require consideration are these—

Is the patient likely to be able to expel his enemy by coughing?

Is the vomica in a place which is accessible?

Are there any special dangers connected with the performance of the operation?

As regards the prospects of removal of the cyst by coughing efforts.—This has already been alluded to. Of course, much doubt must always exist. Sometimes a large ruptured cyst, after partial evacuation, will so seal up its cavity, that although cough and moderate expectoration continue for many months, no shreds of cyst are expelled, and no serious constitutional disturbance takes place. I have had such a case under my observation for several months past. It is not likely that a patient who suffers so little present inconvenience would consent to undergo a serious surgical operation, and yet he is in considerable peril.

A large shred of cyst may become detached, and choke him; the blood-vessels on the walls of the hydatid capsule are becoming degenerated, and perhaps dilated, and from this cause profuse or fatal hæmorrhage may

come on ; and finally, at any time, putrefactive changes may take place in the contents of the cavity.

But if the cyst is small, and shreds of membrane are frequently expectorated, whilst the patient does not materially suffer in his health, he will probably elect, and perhaps rightly too, not to undergo an operation.

Undoubtedly many such cases recover. But if there are clear indications of a large cavity, and the patient has copious and perhaps foetid expectoration, with pyrexia, night sweats, &c., it is clearly the physicians' duty to urge operative interference.

In illustration of the hopelessness of expectant treatment in some cases of large ruptured cysts, I may allude again to the case of Peter S. Here a careful examination of the lung, after death, showed that four or five bronchial tubes opened into the cavity, but the largest of them did not exceed the diameter of No. 6 or 7 English catheter. The collapsed cyst had a superficies of 256 square inches, and weighed in the moist state ten ounces.

Having such a case before us, the question of the accessibility of the cavity arises ; there are some parts of the thoracic walls which at present must be considered not open to operative measures, viz., the part covered by the scapula behind for obvious reasons ; the inter-scapular regions, too, from anatomical causes permit "no thoroughfare," for between the transverse processes of the vertebræ and the posterior edge of the scapula there is but little space available, and that is occupied by the thick muscles of the back.

The supra-clavicular region is, of course, inaccessible from the large blood-vessels and nerves which lie in it, and the first interspace is likewise a dangerous locality ; all the rest of the chest, front and back, is open country, bearing in mind, of course, the situation of the heart and great vessels, the liver, spleen, &c.

Practically, when a cyst is of sufficiently large dimensions to call for Radical operation, it is usually easily accessible, for even when it is situated beneath the scapular region it may be reached from the axilla, and I have in two cases, operated successfully on hydatid cavities situated in the upper lobes of the lungs, by incisions made in the axilla ; but I have a lady under observation at present, in whom the extreme apex of the left lung contains a hydatid cavity which is not, in my opinion, large enough to be reached from any safe point.

In considering the accessibility of hydatid cavities, we have to consider also their nearness or remoteness from the surface.

This is, of course, a very important matter, for no operator can be indifferent to the amount and physical conditions of the lung substance that intervenes between himself and his goal. This can be estimated by cautiously introducing a sharp canula connected with the aspirator, and noticing the depth at which gas or fluid is reached. When

the instrument is well inside the cavity, its point can be freely moved in various directions.

THE IMMEDIATE RISKS OF THE OPERATION.

The first point that suggests itself is, whether there exists adhesion between the part of lung occupied by the cyst, and the opposed parietal pleura. Unfortunately, it must, for the present, be admitted, that there are no trustworthy means for deciding this important point.

The mere size of a cyst is not a reliable criterion as to the certainty that adhesions exist, for Seraillier* has placed upon record a case, where the lower lobe of the right lung was occupied by a hydatid, of the size of foetal head at term, and yet, there was no adhesion with the costal pleura.

Probably, other things being equal, a ruptured cyst is more likely to have formed adhesions than an unruptured one. It has been suggested by Fenger and Hollister, that before proceeding to incise the lung, an incision should be carried down to the intercostal muscles, and then a hypodermic needle be passed into the lung, and the instrument should be watched during the phases of respiration.

"If it does not move synchronously with the respirations we may be sure that at this place, there are adhesions between the layers of the pleura, and may consequently cut in without fear."

This point deserves careful research, inasmuch as it promises to supply a much-needed aid to the physician.

It has been ascertained experimentally, that the expansion of the lung during inspiration takes place in two directions, *i.e.*, from above downwards, and from behind forwards, "for the former movement the fixed point is the apex, for the latter, a point on the posterior surface of the lung." (Guttman.)

Doubt as to the existence or non-existence of adhesions, however, should not, in my opinion, forbid Radical operation, for it is usual, although not invariable, for large hydatids to cause adhesions of a very dense character, and if the trochar be used, I consider that the operation should be performed, adhesions or no adhesions.

MODE OF OPERATION.

As regards the mode of operation, I decidedly prefer to cut down upon the intercostal muscles, and after the arrest of any hæmorrhage that may occur in doing so, to pass a large trochar into the cavity. If the cavity be near the surface, the trochar may be removed, and a suitable dilating forceps passed in along its track, the lung wound can then be torn open to the desired amount; usually, the coughing efforts of the patient, aided by a suitable posture, will cause the cyst to present at the wound, it may then be cautiously removed by the fingers and forceps. It is very desirable to

* See Hearn, *Op. cit.* Obs. xix., p. 123.

remove, if possible, the entire mother-cyst at once, for if any pieces are left, suppuration will continue until their expulsion.

I do not think it desirable to inject the cavity unless its contents are very foetid, for the injected fluid finds its way into the bronchial tubes, and causes violent, suffocative, cough. Sometimes injections are requisite, then a counter opening should be made, or, at anyrate, free vent for the fluid should be ensured. I do not approve of any medication of the injection; plain warm water, is, in my opinion, the best; and the object of injection should be simply to remove any shreds of membrane left inside.

The use of the trochar, instead of the knife, for opening the lung, gives, I think, considerably greater chance of avoiding hæmorrhage. If such an accident did occur, probably the use of one of Barnes' fiddle-shaped india-rubber bags would effectually control it, and the shape of the bag would tend to prevent its expulsion by cough, &c.

As regards counter-openings; they are certainly not always needed. I have had occasion to use them only in one out of my five cases.

If the opening, originally made, drains the cavity well, there is no need for a second one, and if the finger be passed into the cavity it may be explored in order to ascertain this point, and also where the most favourable place for the counter-opening is, if this should be required, then a short-beaked steel bladder-sound can be passed in, and the new wound carried down upon its point.

AFTER TREATMENT.

Drainage must be carefully attended to, and in my opinion, the best appliances for this purpose are one or two large india-rubber tubes.

It is especially important not to remove the drainage tube too soon.

DRESSINGS.

I do not believe that strict Listerism is necessary, or in most cases possible. Usually the cavity is foetid to begin with, then there is free entry of air through one or more bronchial tubes of such calibre that filtration of germs cannot be expected. Finally, the discharge is commonly very profuse at first.

Upon the whole, a thick pad of well-picked oakum, enclosed in a bag of gauze answers very well.

As regards the after-risks, there is a chance that the lining membrane of the cavity may become gangrenous and cause fatal blood-poisoning, and this may happen even after the entire cyst has been removed and ample drainage provided.

CASES.

CASE I.

Suppurating Hydatid in the lower part of the Right Lung. Radical Operation.—Cure.

Thomas E., aged 30, teamster, residing at Black Rock Plains, a native of South Australia, was admitted into the Alexandra Ward of the Adelaide Hospital, under my care, on December 13th, 1883.

He was formerly a well-built powerful looking man, although now presenting a somewhat phthisical appearance, and he states that he has always lived in South Australia. For two years he lived at Millicent (South-East), and worked on the Drainage works in that neighbourhood.

He left Millicent seven years ago.

His health was good until about two years ago, when he became an in-patient at the Port Augusta Hospital, suffering from an illness which was pronounced to be inflammation of the lungs. In consequence of this, he was laid up for about nine months. He sometimes spat blood, but he never at that time noticed any "skins" in the matters expectorated. He has never been well since, and has always had more or less cough and expectoration. About three months ago he brought up a piece of "skin," and since then about half-a-dozen more at various intervals of time.

December 13th, 1883.—He is now troubled with severe cough, accompanied by purulent expectoration in considerable quantity. For example—This morning he brought up about half a pint.

Physical Signs.—

There was considerable dyspnœa. Expansion notably diminished at right base.

The percussion resonance was imperfect over the right back down to a little above the angle of the scapula; below that, there was marked dulness extending to the base.

In the Right supra-spinous region the respiratory murmur was audible, but expiration was somewhat prolonged. In the infra-spinous region the respiratory murmur was weak, and near the angle of the scapula it was lost somewhat abruptly.

Here, too, vocal resonance and fremitus ceased.

Right Front.—

Resonance fair down to third interspace, below that muffled resonance down to fifth rib, after which there was absolute dulness lost in the normal hepatic dulness.

Below the fifth rib in front, no respiratory sounds were audible, and in the lower axillary region they were also absent below the level of the nipple.

Vocal Resonance and Fremitus were lost over the area of dullness.

The Heart's apex was found to beat with maximum force in the fourth left interspace, but at about the normal distance from the sternum. Cardiac sounds normal. The lower edge of the liver dullness was not below its normal limits.

The Left Lung presented no signs of disease.

The Diagnosis of ruptured hydatid in the lowest lobe of the Right Lung was made, and after careful examination, I decided to make a free opening into the sac, in order to permit the escape of its contents.

December 20th, 1883.—Ether being administered by Dr. Dunlop, I made an incision in the eighth space, posteriorly, in the right scapular line. The external incision, about three inches long, was carried down to the intercostal muscles. A puncture was then made by the scalpel, of size sufficient to permit the introduction of Bigelow's forceps for dilating the urethral meatus, by means of which a large opening was torn into the cavity of the hydatid. Pus escaped in considerable quantity, accompanied by large quantities of hydatid membrane, most, if not all, of which consisted of the mother-cyst. This was of a brownish yellow colour, and the matter evacuated had the very offensive odour characteristic of decomposing hydatid contents.

Upon passing the index finger into the interior of the cavity, the surface could be felt to be smooth and soft, and at one point the orifice of a bronchial tube, of about the size of a cedar lead pencil could be felt. The amount of bleeding was quite insignificant. During the operation the patient had rather severe paroxysms of cough, during which he brought up some blood-stained fluid and small shreds of membrane. Two large india-rubber drainage tubes of different lengths, were inserted into the cavity and secured by elastic tapes around the chest.

December 21st, morning.—The dressings and drainage tubes were removed and the cavity washed out with warm water, by means of a Higginson's syringe, but no shreds of membrane came away. Temperature normal. He has now scarcely any cough, and he feels very comfortable.

Afternoon, 3.30, temperature 101° ; 6.30 p.m., $103^{\circ}0$.

December 22nd.—Dressed. To-day some yellowish bile-coloured (?) discharge escaped, and in the course of the day he coughed up some yellowish expectoration having a bitter taste.

Morning temperature, normal; evening temperature, 102° .

On the 26th it was noted that he was sweating freely.

December 28th.—A large quantity of tenacious mucous and yellowish (bile-stained ?) discharge was found in the dressings, and he expectorated a small quantity of similar matter, but he now had very little cough and his appetite was good. He was well enough to sit up.

January 14th, 1884.—His progress is very satisfactory. He still has one drainage tube in the cavity. There is a good deal of watery bile-

stained discharge. The general direction taken by the tube and probe is forwards and downwards. To-day he has caught a cold, and has nasal catarrh in consequence, but it does not seem to have affected his general health.

January 22nd.—The large drainage tube that he has hitherto worn has slipped out and cannot be re-introduced, so that a smaller one has been inserted. There is very little discharge, and the patient is gaining flesh.

February 2nd.—Patient has gained 11 lbs. in eleven days.

A laminaria tent was inserted to-day, in order to dilate the sinus, which appeared to be contracting too rapidly. This permitted the insertion of a large drainage-tube. Probed with a gum-elastic catheter the distal wall of the cavity is touched at a depth of $5\frac{1}{2}$ inches.

February 14th.—The tube was shortened to-day to a length of $3\frac{1}{2}$ inches. The patient is making excellent progress.

February 25th.—Drainage tube now 3 inches long. The patient was sent to the Convalescent Hospital.

February 28th.—Tube finally removed, as there was scarcely any discharge.

March 3rd.—Patient doing well. Hardly a trace of discharge since the drainage tube was removed.

March 6th.—Wound scabbed over. Respiration over right front normal; over the right back rather weaker than on left side.

Weight, 12 st. 2 lbs. ; height, 5 ft. 10 in.

Left, to resume work at Hergott Springs.

April 17th.—Wound healed. Patient still gaining strength, but complaining of soreness under the margin of the thorax.

The temperature was taken almost regularly twice a day (morning and evening) from December 13th, 1883 (date of admission) to February 19th, 1884, and during this period 107 observations were recorded. Almost always the temperature was normal ; but on December 21st the afternoon temperature was 101° ; in the evening it reached 103° .

On the evening of the 22nd, it was 102° , and on that of the 23rd $100\cdot4$. For the rest, the temperature may be described as normal.

CASE II.

Hydatid Cyst in lower part of the Right chest, possibly Pleural.

Puncture, and afterwards Radical Operation.—Cure.

John T., aged 22, was born at Kanmantoo, near Nairne, where he lived till he was nine years of age, then he resided at Kadina for a year, and subsequently at Palmer, near Mannum, for two years, after which he returned to Kanmantoo, where, for the last nine years he has been chiefly engaged in farm work, but during the last three or four years he has also assisted his father in butcher's work. Whilst at Kadina he drank tank

water, which was usually clean, but occasionally derived from roads and surface land, and here he suffered from an attack of "Low Fever." At Palmer the drinking water was procured from a mining shaft, about 20 feet deep, and at Kanmantoo, tank water, collected from the roof of the dwelling house is used, which is very dirty, owing to the roof being covered in part with old shingles. Several dogs are kept on the premises, and fed on the uncooked "plucks" of the slaughtered animals. About a year ago he had to consult Dr. Deane, of Nairne, for a slight cold, but with this exception, and that above-mentioned, he has always enjoyed good health.

When I first saw him, on October 16th, 1883, he complained that for more than two months his breath had been getting rather short, and that he had been losing strength, and also had pains referred to the left front of the chest, and to the right interscapular region. He had never had hæmoptysis. On examination he appeared to be a healthy, robust, man, and nothing abnormal could be detected in the lungs or heart, but on percussing out the limits of the liver, it was found that its area of dulness was apparently increased in an upward direction, but inside the right nipple line only, where it reached to the level of the upper border of the 4th rib.

As I suspected that I was dealing with a small hydatid on the upper surface of the liver, I punctured with a No. 1. Charrière's needle in the fourth interspace, just inside the right nipple line, and drew off about three pints of clear hydatid fluid. Very little pain was felt, and on the following day (October 17th) I introduced a larger aspiration needle, (No. 3, Potain) in the same spot, and removed 360 c.c. (12 fluid-ounces) of similar fluid, containing many small shreds of cyst, and a large number of groups of scolices.

The second aspiration was followed by some serious symptoms. The temperature two days after, was $104^{\circ}.2$, and although the patient complained of no hepatic pain, there were severe headache and occasional cough and restlessness at night. On the 21st absence of resonance and of vocal fremitus was noticed at the right base posteriorly, where the breath sounds were weak, but no friction could be detected. The following day he was admitted into the Adelaide Hospital, under my care.

October 22nd, 1883. His condition on admission was as follows:—T., 103° ; P., 136 ; R. 44. Patient complained of pain in the right mammary region, and of oppression in breathing; impairment of movement of the whole right side of the chest, with some apparent bulging in the mammary region which was not corroborated by actual measurement, the right semi-circumference being $\frac{1}{4}$ inch less than the left; dulness on percussion at the right base posteriorly, and in the axilla, with hyper-resonance at the angle of the scapula, in the upper axillary region and over the front of the chest down to the 6th interspace; vocal fremitus

diminished at the right base, but not much impaired elsewhere ; respiratory murmur weak and distant all over the right side ; occasional amphoric crackling sounds over right lower lobe. The heart's apex beat just outside left nipple line. The physical signs pointed conclusively to pneumothorax, with a certain amount of fluid in the pleura, due probably to escape of both air and hydatid fluid into the pleural cavity during the aspiration, and to the inflammation which had been set up in consequence. In order to relieve his symptoms, I made an incision under ether, and with antiseptic precautions, in the 10th right interspace, about $4\frac{1}{2}$ inches from the spine, and introduced a large tube into the pleural cavity, a considerable amount of thin fluid being evacuated. Next morning (23rd) he was very weak, P., 135 ; T., 102.4. No breath sounds could be detected on the right side, and there was severe dyspnœa, which became worse towards evening, and necessitated an extension of the incision, so that the skin opening, which had become valvular, might coincide with that in the pleura. Ev. T., 104°.2. On the 24th, the wound was dressed, the opening into the pleura was enlarged and the tube passed further in ; about 10 ounces of serum escaped, with great relief to the symptoms, and especially to the dyspnœa, and the heart, which had before been beating $1\frac{1}{2}$ inches outside the nipple, now came back to inside that line. Specks of blood were noticed in the sputum to-day for the first time. An attack of diarrhœa set in. On the 25th, patient was easier and better, the diarrhœa having stopped, T., 100.6 ; R., 30 ; P., 110, but weak and dicrotous, the skin acting freely. The wound was dressed under the spray and looked well, the discharge being clear serum, the heart's maximum impulse was outside the nipple line in the 5th space. From October 26th to the 31st the wound was dressed daily, the discharge being abundant in quantity and sero-purulent in character. The temperature ranged between 99°.6 and 102°.4, being usually higher at night time, the pulse improved in strength, but the cough continued, with expectoration of tenacious nummulated matter, and there was considerable sweating, well-marked amphoric breathing, with an easily elicited metallic echo, was heard down to the 5th right rib ; the heart's impulse was in the nipple line. The patient was allowed to get up on November 4th, and to go out of doors on November 7th. On November 6th, a piece of hydatid membrane, the first instalment, came out through the tube during the dressing, and considerable relief to the troublesome cough ensued ; the discharge was now quite purulent, but sweet. There was tympanitic resonance all down the front and side of the right chest to the posterior axillary line, and over the back a triangular area of dulness with its base below and apex at the angle of the right scapula. During the next two months, the progress made was very tedious ; the temperature varied from sub-normal to 101°.4. The cough and expectoration continued, pain in the left side was frequently complained of, pieces of membrane, sometimes of considerable size, were

expelled from the wound on several occasions. The fingers became clubbed, night sweats and some cedema of the extremities were noticed, but the patient did not emaciate to any noticeable extent.

On January 2nd, 1883, the drainage tube slipped out and a smaller size had to be substituted, as it could not be re-introduced. Boracic Lotion was used instead of carbolic, on account of erythema in the neighborhood of the wound. On the 3rd, two laminaria tents were inserted into the wound and removed next day, when much pus and hydatid debris came away, the pleural cavity was washed out, the injection setting up a good deal of cough, and a large drainage tube was inserted. On the 7th, the wound having been again dilated by means of three laminaria tents; during injection of the cavity, a severe attack of coughing caused the expulsion of the remainder of the hydatid membrane; the original cyst must have been very large. On the following day the washings from the pleura were quite clear, and the following physical signs were noted:—Fair resonance in right front down to nipple, with almost normal breath sounds. In the axilla and over the back, the dulness reaches about two inches higher up, and the breath sounds are scarcely audible, although vocal fremitus can be felt. From this date patient made a rapid recovery, the cough ceased at once, the discharge was much diminished, the temperature was henceforth normal, and the patient gained steadily in weight. The sinus contracted up and the tube was left out on February 28th, the patient having been sent to the Convalescent Home on the 25th.

On March 26th patient presented himself for examination. He was in very good health, and the wound had been quite healed for some time.

On April 26th, he had gained two stone in weight since the cyst had come away. There was slight diminution of percussion resonance, breath sounds and vocal resonance, at the right base posteriorly, and still slight dulness inside nipple in 4th interspace, but the patient was virtually in perfect health.

CASE III.

Hydatid of upper lobe of Right Lung. Radical Operation.—Cure.

A. E. B., æt. 14, is a dull unintelligent lad, unable to give any history, beyond that he has been ill for two or three months, and that his illness commenced with a cough, after getting wet through, and remaining in the damp clothes all day, and that two months ago, he spat up some blood, since which time he has been emaciating; he also states that he has spat up pieces of white skin on several occasions.

He is a native of South Australia and resides at Gawler.

He was admitted into the Adelaide Hospital on January 30th, 1884, complaining of paroxysmal cough, with profuse expectoration and of night

sweats. The youth was considerably emaciated, and presented a decidedly phthisical appearance. On examining the chest, slight bulging was noticeable of all the interspaces on the right side in front, excepting the second and third near the sternum, and the maximum cardiac impulse was found to be in the left mammary line; the right semi-circumference of the thorax was 14 inches, and the left $13\frac{1}{2}$ inches. A tubular percussion-note was obtained in the first two right interspaces, but below that, there was toneless dulness, in the axilla the percussion-note was amphoric down to the level of the nipple, over the right back there was absolute dulness in the supra-spinous and upper half of the infra-spinous fossæ, but below this, down to the seventh rib, and also in the inter-scapular region high pitched tubular resonance was obtained; right base posteriorly, resonance normal. The whole of the Right Lung expands very deficiently, but more especially the upper lobe.

On auscultation, the respiratory sounds in the right supra-clavicular region were divided, expiration being prolonged; below the clavicle there was cavernous breathing with increased vocal resonance, and also in the axilla, but less distinct at the posterior fold. In the right supra-spinous fossa, the breath sounds were weak and divided, in the infra-spinous region the inspiratory murmur was harsh, below the angle of the scapula the breathing was puerile.

At the left apex harsh and prolonged expiration with moist rales was noted.

The liver was not found to be displaced downwards.

On February 8th, ether was administered, and I made a skin incision in the fifth interspace in the anterior axillary line, three inches outside and $\frac{3}{4}$ inch above right nipple, and plunged a large trochar and canula into the lung, and then dilated the opening with Bigelow's urethra dilator; a considerable quantity of very fetid fluid came away, and afterwards the whole of the cyst; there was considerable hæmorrhage at the time; two large-sized drainage tubes were introduced into the cavity. The next day (February 9th) a good deal of glairy discharge was found in the dressing, and the temperature was normal, but the patient had not slept well.

On February 11th, the drainage tubes were removed, washed, and replaced, and it was found that a catheter went into the cavity to a depth of $4\frac{3}{4}$ inches, upwards and inwards. Since the operation, the cough had been much less, and patient only complained of a little soreness about the wound.

From this date patient rapidly improved, and the temperature was sub-normal; the cough disappeared, and the discharge from the wound became very slight.

On February 18th one tube was left out.

On February 25th, there was still a high-pitched tubular percussion-note on the right side down to the third rib, in the supra-clavicular fossa and



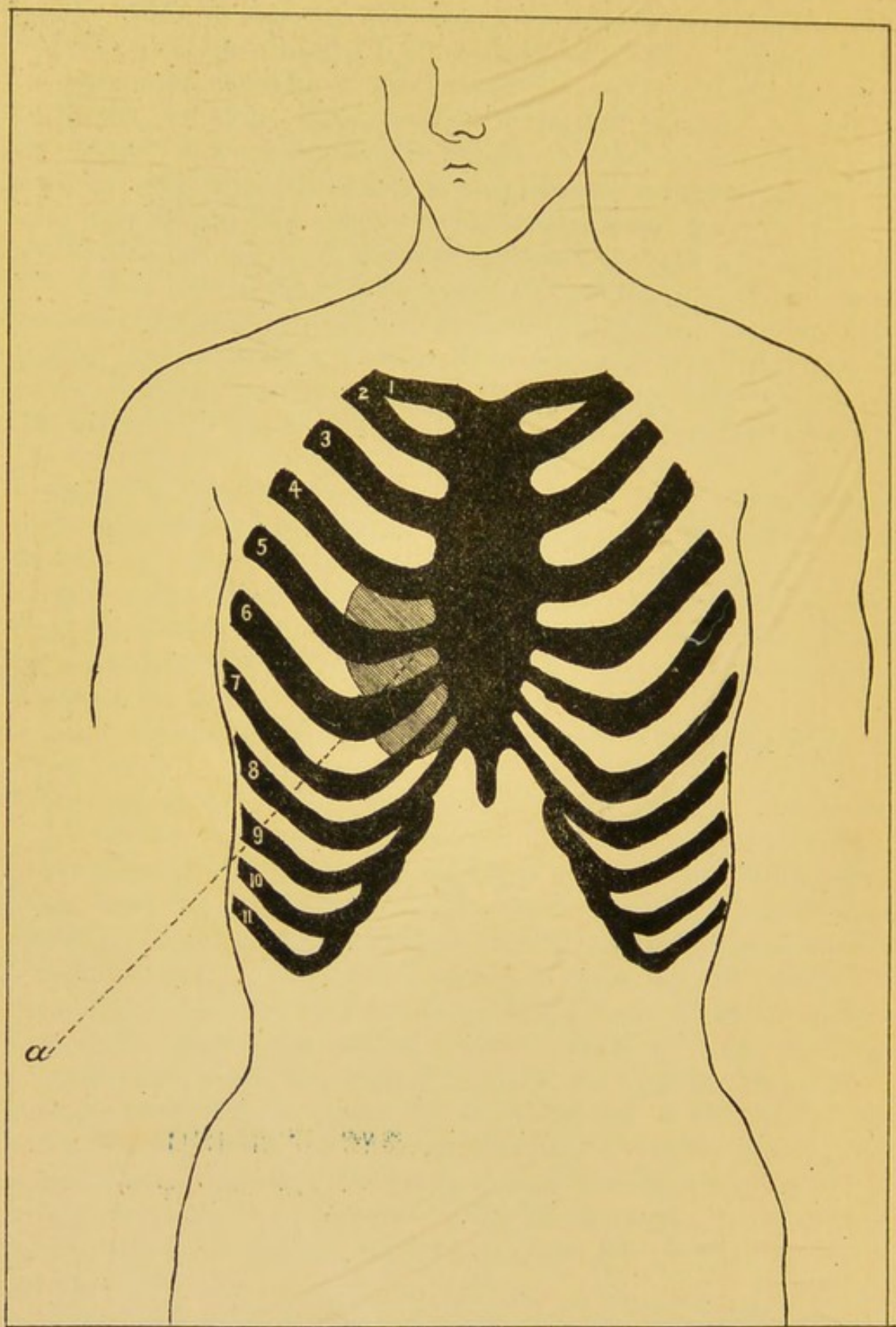


PLATE 2.

PETER S—, March 28th, 1882.

a. Area of tympanitic percussion-note.

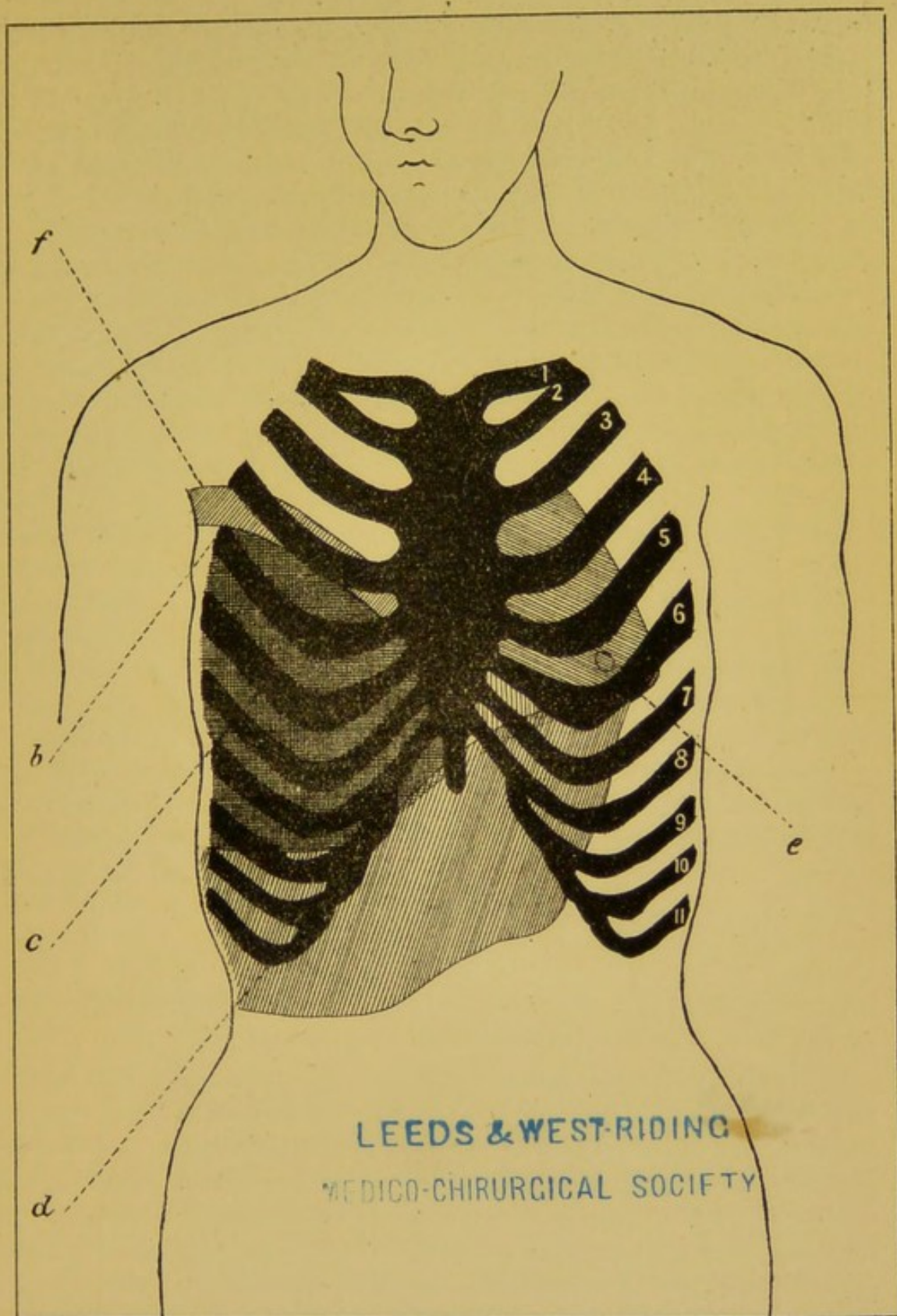


PLATE 3.

PETER S—, April and May, 1884. *b.* Upper level of dulness on April 29th.
c. Hydatid Cyst. *d.* Liver displaced downwards. *e.* Heart displaced
 to left. *f.* Upper level of dulness on May 27th.



first interspace, the respiratory murmur was divided ; in the second interspace somewhat "blowing," but below that, much more markedly blowing.

On March 10th, a smaller drainage tube was inserted, and this was left out altogether on March 20th.

On March 24th, he was sent to the Convalescent Home, the breath sounds over the right side almost approaching to normal.

He again reported himself on March 29th, when the sinus was found to be $4\frac{1}{2}$ inches in depth. There was very little discharge.

On July 10th, 1884, he called on me ; he said that he felt strong and well and had no cough. He is employed in hard manual labour *i.e.*, grubbing stumps. There is a slight moisture at the wound, but so scanty as not to require any dressing. A little above and inside the sinus, there is audible, increased vocal resonance and somewhat tubular breathing. No other indication of disease, past or present. No retraction of the chest.

August 23rd, 1884.—Boy came to-day to be inspected. Says that he feels quite strong and well ; has no cough ; his breath is a little short upon exertion. There is still a small sinus left, into which a gum-elastic catheter, size No. 1, can be passed to the depth of four inches, its end then strikes apparently the internal wall of the cavity. At present, there is no dulness on percussion on the right side ; no tubular breathing.

September 20th, 1884.—The boy called to-day and stated that he had now no cough and felt quite well. The sinus had quite closed up for the last week, and there was a firm scar over the seat of the original wound. Still some dulness, and the physical signs of a small dry cavity remained ; Weight, $82\frac{1}{2}$ lbs. ; height, 4 ft. 11 in.

CASE IV.

Old Suppurating Hydatid in upper lobe of Left Lung ; Symptoms of Phthisis : Radical Operation.—Recovery.

Mrs. H. H., aged thirty-five, consulted me first in January, 1884. She was born in Cornwall, and came to South Australia ten years ago, since then she has lived at Nantawara, Port Wakefield, Nailsworth and Walkerville ; she has been accustomed at times to drink bad water from exposed, ground-level tanks, and dogs have generally been kept. Six and a-half years ago, she consulted Dr. McIntyre for pains in the chest and dry frequent cough, and took medicines for three years off and on. About 18 months ago she consulted Mr. Ellison for pain in the chest, dyspnoea and cough without expectoration, and eight months ago he aspirated the chest, over three pints of fluid being withdrawn ; immediately after this she began to cough and spit up great quantities of fluid, and during the night succeeding the operation the discharge was enormous. No skins were brought up.

From that date she commenced to emaciate, the cough continued and there was a daily expectoration of fully half-a-pint of sputum, and now she presented the appearance of a patient in the advanced stage of consumption.

January 30th, 1884. STATE ON EXAMINATION.—Extreme emaciation, chest flat, expansion very deficient over both fronts. Left Lung.—Percussion resonance shorter and higher-pitched down to 3rd rib, below this dull with “*bruit de pot fêlé*,” and in axilla, deficient down to 5th rib, the dulness diminishing however from above downwards; on auscultation, very little and very weak breathing over whole front, but cavernous in character, and accompanied by whispering pectoriloquy, more especially in the second and third interspaces; in the axilla, very weak breathing down to fifth rib, whispering pectoriloquy however being less distinct than in front. The back is absolutely dull from apex to two finger's breadth below spine of scapula, and in the interscapular region down to level of spine of scapula, but below these limits there is fair resonance.

Right Lung.—Physical signs normal, except for a little weak breathing and increased vocal resonance above the clavicle and both above and below the spine of the scapula. Heart's impulse at normal site.

Her general condition being so unsatisfactory, I hesitated considerably before advising here to undergo the operation, but the matter having been put before her very plainly, she decided to accept the risk, as she felt that she could not survive very long in her present condition.

On February 11th, she was put under the influence of ether by Dr. Dunlop, and an incision was made in the 4th left interspace in the anterior axillary line; a small trocar and canula were first introduced, and then a large one, through which several pieces of hydatid membrane came away, broken down and jelly-like in consistence; but no fluid. Very little constitutional disturbance followed, the cough continued however and some pieces of cyst came away through the tube, but on the 15th the canula slipped out and the patient was in great pain till it was replaced by a drainage tube; a probe passed into the cavity for $4\frac{1}{2}$ inches, but the internal orifice was found to be $2\frac{1}{4}$ inches from the surface. On the 16th, the sinus was dilated with laminaria, and an attempt made to wash out the cavity, but it set up too much irritation and coughing. Large pieces of membrane continued to come away till the 20th, and in a few days the discharge lost its fœtor. On February 24th, dulness and weak breathing were noticed over the left base posteriorly, but at the end of another month, this dulness had entirely disappeared, except for this, the convalescence, though slow, was uninterrupted, and at the end of a month from the time of the operation she was able to lie on the left side, which she had not been able to do for six months previously, and was able to get out a little every day. The cough varied from time to time in intensity, and the expectoration both in amount and in quality; smaller tubes were gradually substituted, and then catheters; on May 15th, the drainage tube was left out altogether, the

discharge from the sinus subsequently being very slight. She left the Hospital on June 25th. I examined her again on September 24th, when she stated, that she was in excellent health, and still gaining flesh, the cough being scarcely at all troublesome and the expectoration scanty. The sinus had healed some time. There was now very fair expansion of the left front, but below the 2nd rib the resonance on percussion was somewhat shorter, and the respiratory sounds harsher than on the opposite side, and the same signs were noted over the back, but there were no distinct signs of a cavity.

CASE V.

[See Plates 2 and 3.]

Huge Hydatid of the Right Lung; Radical Operation; Death on the twenty-first day after removal of the Parasite.

Peter S., aged 43, wheelwright, consulted me in March, 1882, and gave the following history of his illness :—

About six years ago he began to suffer from severe pain in the lower part of the right side of his chest. For a couple of years or so the pain came on at intervals, but at times it would be absent for months together. But about four years ago the pain became so severe as to compel him to give up work for about a month. After this, he spat up bright blood occasionally. The blood-spitting was more frequently induced by mental excitement than by physical exertion. The Hæmoptysis was frequently repeated, but never copious, its amount never exceeded a tablespoonful at any one time. For some time past he has had cough of no great severity, accompanied by glairy expectoration.

Upon examination, the following physical signs were observed :—

Over the lower part of the right chest in front there is an area of tympanitic resonance, which extends from about the fourth rib above, down to the usual upper line of liver dulness. It lies inside the right mammary line, and extends to about mid-sternum. Over this space normal respiration sounds are wanting, but there is friction of respiratory rhythm. There is a systolic murmur at the apex of the heart.

The patient was recommended to submit to an exploratory puncture, but he declined to follow the advice, and for a long time I heard nothing more about him.

Two years elapsed, and the patient again consulted me, and he stated that during the interval his cough had increased in severity; that he had become weaker, although he had not lost much flesh, and that the right side of his chest had been gradually enlarging.

April 29th, 1884.—He is a spare man, whose height is 5 feet 9 inches, and his weight 132 $\frac{3}{4}$ lbs.

There is visible cardiac impulse in the fourth, fifth, and sixth left inter-

costal spaces, over an unduly large area, and also in the epigastrium. Marked bulging of the lower part of the right chest, especially in the front and axillary regions, and there is conspicuously less movement of the whole Right than of the Left side of the chest, this is particularly well-marked below the nipple, where there is scarcely any expansion during inspiration.

The Right costal angle is considerably more obtuse than the Left. No fluctuation can be discovered in the interspaces over the area of bulging.

Percussion.—Right Chest—Resonance normal down to the third rib; below this, in the Right mammary line, there is absolute dulness; but the upper line of dulness occupies a lower position in the para-sternal line, and a still lower one at the right edge of the sternum. This line of dulness is not modified by change from the erect to the recumbent posture. In the right mid-axillary line, dulness at and below third interspace posteriorly. There is absolute dulness from the middle of the infra-spinous fossa down to the extreme base; but in the inter-scapular region dulness commences at about the level of the angle of the scapula.

Vocal Fremitus is lost below the upper line of dulness, both in the front and back of the chest.

Respiration, Right Side—In front, divided respiration, with some prolongation of expiration down to the upper line of dulness already described; below that absolute silence. In the Right axillary line there is also silence below the third interspace. Right back—In the supra-spinous fossa respiratory murmur is weak, but not otherwise altered; below the spine of the scapula the respiratory murmur is lost, except on very deep inspiration, when it may be heard an inch or so lower. At the back, as in front, the respiratory murmur ceases to be audible immediately below the line of dulness, being heard much lower down in the vertebral groove than in the right axillary line.

The Left Lung presents no abnormal physical signs except puerile respiration.

The Heart's apex beat is too "diffused," being visible in the fifth and sixth interspaces, two inches outside the left nipple line. There is a visible impulse also at the epigastric notch. At present, there is no decided cardiac murmur, but the first sound at the fourth left cartilage is not "pure." There is no thrill.

The diagnosis being now clear, the patient was urged to submit to operation without delay, but in consequence of certain family matters he delayed for another month.

He presented himself again on May 27th, 1884, and stated that he suffered much pain over the whole right side, but especially at the back along the outer border of the erector spinæ. This pain is so severe that he can scarcely lie down, and consequently he cannot sleep at night.

This cough is frequent and almost dry, only a little glairy "slime" being expectorated. He has had no hæmoptysis since last visit. The upper line of dulness is now at a conspicuously higher level than it was a month ago. The patient was admitted into the Alexandra Ward of the Adelaide Hospital, under my care.

June 1st, 1884.—To-day, at 11.15 a.m., the patient being placed under the influence of ether, a steel trochar, attached to a manometer, was introduced in the fifth interspace in front.

During inspiration, the manometer showed an intra-cystic pressure of 25 inches of water; during expiration the pressure rose to $30\frac{1}{2}$ inches; but when the patient coughed, as he did in the course of a few seconds, the contents of the manometer were forcibly expelled to a distance of several feet beyond the instrument.

The manometer being detached, the long india-rubber tube attached to the needle, was passed to the bottom of a bottle, and the fluid was allowed to flow by syphon-action.

After about eight ounces had been removed, the fluid contents of the cyst commenced to escape into the bronchial tubes, and violent suffocative cough came on, with alarming dyspnœa. As rapidly as possible I inserted a large trochar near the site of the original puncture, in order to evacuate the fluid as quickly as possible. It poured out in such quantity that forty-eight (48) ounces were collected in various vessels, and fully an equal quantity must have been lost on the floor, bedding, &c. The fluid was at first nearly clear, slightly opalescent, and evidently contained numerous groups of scolices; the later portions of fluid were moderately blood-stained. When the flow of fluid through the canula ceased, the latter was removed, and partly with the knife, partly with the dilating forceps, an opening into the hydatid cavity, large enough to admit the index-finger was made.

When the patient lay on his back I was unable to reach the collapsed parasite with my index-finger fully inserted, but by rolling him over on his side the mother-cyst fell over towards the opening.

In consequence of the cough and severe dyspnœa some delay was caused in the removal of the parasite, but ultimately it was extracted entire, partly by the careful use of fingers and forceps, and partly by the voluntary coughing efforts of the patient, who was now sufficiently awake to assist.

No daughter-cysts were noticed.

The patient was seen by me again at 10 p.m., when Dr. Dunlop reported that there had been tolerably sharp bleeding from the wound, and that some blood-stained fluid had been expectorated. It was suggested that if any further bleeding took place the india-rubber drainage tubes which had been introduced at the completion of the operation should be removed and replaced by a large gum-elastic catheter, and one of Barnes' fiddle-shaped air-bags.

This, however, was found to be unnecessary. The patient expressed himself as much relieved by the operation.

It would be tedious to record the daily history of the case, but the main points were as follows :—

June 5th.—As there was a considerable amount of sanious and foetid discharge, the original wound which had become “valvular” was enlarged and a counter-opening was made in the ninth interspace posteriorly.

The subsequent history of the case was, that the discharge from the cavity continued to be very offensive, in spite of frequent injections of water containing Condyl’s fluid, oil of Eucalyptus, &c., and the use by the patient himself of antiseptic inhalations.

Shreds of the sloughing sac of the cavity came away. The patient gradually became weaker, lethargic and drowsy, and died on June 22nd.

NECROPSY.

June 23rd.—Body emaciated. There is a wound in the fifth right interspace, about one inch to the right of the nipple line. It is large enough to admit the index finger ; its edges are grey and sloughy, and the sixth rib, near the wound, is bare and discoloured.

In the ninth interspace posteriorly, there is another wound of similar dimensions.

Left Lung.—Much recent lymph over its surface, and especially in the inter-lobular fissure.

At the base, grey hepatisation, and in places the lung is almost diffuent, breaking down easily under the pressure of the finger.

The parietal pleura on the left side is abundantly covered with lymph.

Right Chest.—The lung is retracted to the extent of about an inch from the medium line. Over almost its entire extent the right lung is adherent to the chest-walls by old and very firm adhesions. Viewed from the front, the lower two-thirds of the lung are replaced by a huge cavity ; the upper third consists of condensed lung-substance, which, however, contains sufficient air to float in water. Behind, the condensed lung extends about half way down, the rest is cavity. Regarded from the stand-point of bulk fully four-fifths of the right lung have disappeared.

The interior of the cavity has dirty-grey, rugose walls, upon which irregular linear elevations exist, probably the remains of obliterated vessels and bronchial tubes. Both near the top and base of the cavity, rounded bridges of tough and degenerated lung-tissue cross the cavity from within outwards. The one near the base is three inches long, and of the thickness of the little finger. Upon section it shows no traces of patent vessels or bronchial tubes, but seems to be solid throughout. The trabecula, near the top of the cavity, is about two-and-a-half inches long, and of about the same thickness as the one already described. At about its middle a bronchial outlet is found open ; by dissection the tube to which it belongs can be traced up to the main bronchus. The calibre of the inlet into the

lung is equal to about No. 6. English catheter. Three other inlets of bronchial tubes were discovered, all situated at the part of the cavity nearest the root of the lung. The calibre of the largest did not exceed about No. 7, English catheter. In the indurated remains of the lung, between the cavity and the thoracic wall, no trace of tube or vessels could be discovered, and at the situation of the operation wounds the entire thickness of the wall of the cavity did not exceed quarter of an inch.

It is convenient to mention in this place, that the superficial area of the mother-cyst, measured by a competent person, was found to amount to 256 square inches, and drained as completely as possible from fluid, its weight slightly exceeded ten ounces avoirdupois. [It is needless to remark upon the extreme improbability that so large an amount of a tough and elastic membrane could be expelled by coughing efforts, through bronchial openings of the calibre of a No. 6 or 7. English catheter.]

The lining membrane of the cavity was very foetid, but no sloughing *en masse* could be discovered; rather there appeared to be a molecular necrosis of the whole surface. No hydatid membrane was left in the cavity. Inferiorly the base of the cavity was inseparably united to the diaphragm, and the latter was in turn adherent to an hydatid cyst which occupied the upper and outer part of the convex surface of the right lobe of the liver. This cyst was of about the size of the two fists clenched. Being cautiously incised, the fibrous sac was found to be occupied by a large hydatid, collapsed and much folded upon itself. This filled about the upper three-fourths of the cavity, the lower part being filled with smaller cysts containing clear fluid. They were about a dozen in number, and varied in size from that of a walnut to a medium-sized grape. They were probably derived from the large cyst by exogenous formation, or had escaped some time previously from its interior. Between the smaller cysts and the fibrous capsule was a small amount of "atheromatous" matter of the consistence of putty. The liver was unusually large, tough, and heavy, but it did not give the reaction of lardaceous disease. The visceral and parietal surfaces of the pericardium were universally adherent from recent pericarditis.

CASE VI.

Hydatid of Right Lung. Puncture. Rapid Death (probably from Asphyxia.)

[The history of this case was kindly communicated to the author, by Dr. Lonsdale Holden, of the Hobart Hospital, Tasmania.]

George G., aged 23, was admitted into the Hobart Hospital, on March 3rd, 1883, under care of Dr. Perkins.

The patient had suffered from slight hæmoptysis, and other symptoms of early Phthisis, but when admitted into the Hospital he appeared to

have right pleuritic effusion, and it was decided to perform aspiratory puncture.

Dr. Perkins aspirated with a small needle higher up than usual. There was doubt whether any fluid was obtained ; if any, only two or three drachms, and that quite clear and limpid. The patient, who was very nervous about the operation, began to cry out and cough almost directly it was begun, and got rapidly worse ; so the needle, after several additional vacua had been created, was withdrawn. The operation, therefore, lasted an unusually short time. From the moment of withdrawal of the needle the dyspnœa became very urgent, and ended in death, in a little over five minutes. He became rapidly almost pulseless and livid, and his respirations were slow and gasping, and accompanied by much rattling in the chest and throat. A minute or two before the end there was a marked improvement in pulse, respiration, and colour, but this was not sustained for more than half a minute. Frothy mucus came from his mouth in the last moments, but there was no blood or trace of it.

At the *post-mortem* examination, a large hydatid was found to occupy the centre of the Right lung ; there was hardly any lung tissue left between it and the pleura at the front, side, or back of the chest.

Its walls were thick yellow and fibrous ; its capacity more than a pint ; its contents, the skin of a large empty cyst, and an unbroken cyst of the size of a mandarin orange, with a quantity of clear fluid. On one spot upon the wall of the sac was a small bubble-like cyst, the wall of which was torn, and out of which a little fluid escaped when the lung was being detached from its dense attachments to the parietal pleura. The Right lung was almost universally adherent to the chest-wall. There was a little emphysema of the cellular tissue in the anterior mediastinum, and on the surface of the lung ; but only in very small amount. The only opening found on the surface of the lung was a small jagged rent in the wall of the "bubble" already described. No trace of the puncture could be recognised in the lung or through the intercostal space, and hardly any through the pectoral muscles. There was certainly no hæmorrhage along the track of the needle. The middle lobe of the Right lung had disappeared, being replaced entirely by the hydatid cyst ; but the upper and lower lobes were crepitant everywhere, and exhibited no signs of organic disease, and the smaller bronchi in the lower parts of this lung were filled with white froth. The hypostatic congestion was more arterial in colour than is usual. The Left lung was in much the same condition as the Right, crepitant throughout, pale in the upper parts, and dark in the lower ones. Its pleura also was firmly adherent, but not so completely as that on the right side, or so firmly, excepting at one patch over the diaphragm.

The rest of the body (except the brain, which was not examined) showed nothing abnormal.

REMARKS.—This case has been recorded in this place, because it is in

many respects a very important one, and especially inasmuch as death so quickly followed an operation, very trivial in itself.

Dr. Lonsdale Holden, who has supplied the report of the case, also witnessed the operation, and is of opinion that death resulted from syncope, the result of terror and shock. It seems to me, however, that the severe dyspnœa, ending fatally in four or five minutes, the lividity of the face, the coughing, the rattling in the chest, the frothing at the mouth, and the presence of the frothy mucus in the smaller bronchi, point to asphyxia as the cause of death, and this hypothesis is sustained by the fact, that probably no fluid, and certainly very little, was removed by the needle, so that the fluid contained in the large cyst was at once poured out into the cavity, and thence escaped in sufficient amount to flood the bronchial tubes.

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