be borne in mind, the occurrence of diagnostic errors will in time be materially reduced.

CONCLUSIONS

1. Roentgenography may be of definite value in the local diagnosis of renal tuberculosis when other clinical methods fail.
2. The differential diagnosis of nephrolithiasis and nephrophthisis, by roentgenography alone is feasible in the presence of marked tuberculous renal caseation (tuberculous putty-kidney).
3. It is difficult or perhaps impossible in the presence of one or more concrement shadows cast by calcified tuberculous foci within the renal parenchyma.
4. A careful and judicious interpretation of concrement shadows is imperative in order to avoid diagnostic errors of serious consequence.

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ABSTRACT OF DISCUSSION

DR. W. M. SPITZER, Denver: None of us relies implicitly on the roentgenograms, but the more we can develop our technic and the more we can rely on the roentgenograms, the more keen our diagnosis will be. This, of course, is an argument for pyelography. We will eventually, I am sure, when sufficient work has been done, be able to diagnose from the shape of the calices and the kidney pelvis, as well as from the size of the kidney pelvis, various lesions. As to the differential diagnosis between a stone and a caseous mass in the kidney, I do not know that that can always be made. I do not think that the density counts very much. There are dense stones that do not show at all on the roentgenogram, whereas, on the other hand, there are masses of caseous material which show quite distinctly. Still, the closer attention we pay to the study of our roentgenograms, the greater aid we are going to have in making our diagnoses.

DR. MARTIN KROTOSZYNER, San Francisco: Though the differential diagnosis in this instance was materially aided by pyelography, this method should, if possible, not be applied in suspected renal tuberculosis, where it is considered by good authority to be particularly dangerous.

Destruction of Mosquito Larvae by Fish.—In the Gambia the destruction of mosquito larvae by fish is systematically carried out. A constant reserve of fish is maintained at the sea end of one of the drains even in dry season, and as occasion demands some are transferred to other drains, private wells, etc. More and more private individuals are having their wells stocked with fish. This it proves a more efficient prophylaxis than well-covers, which, however thorough in themselves, must of necessity be frequently removed. Fish from the sea introduced into comparatively fresh water are some time in adapting themselves to it, but after a day or two become brisk again and destroy larvae with avidity. Whether it is this change that temporarily upsets them, or the pangs of hunger eventually asserting themselves, though some fish would not touch larvae on their first day in captivity, all fish eat them greedily from the second day onward.

THE OPERATIVE TREATMENT OF TUMORS OF THE TESTICLE

WITH THE REPORT OF THIRTY CASES TREATED BY
ORCHIDECTOMY*

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BALTIMORE

A well-recognized principle in the surgical treatment of malignancy is to excise widely the local growth, to make a clean dissection of all the lymphatics which drain the area and to remove the primary chain of glands into which these lymphatic vessels empty. The mortality-rate from cancer has progressively decreased with the adoption of these more and more radical methods of attack. Simple castration has been long and almost universally the treatment for malignant disease of the testes, and the majority of these patients have been seen to die of metastases which primarily involve the preaortic lymph-nodes into which the lymph-channels of the testicle drain. The radical principle

which is theoretically so rational has not been generally applied to the surgery of the testicle for obvious anatomic and other reasons. Surgeons have been restrained both by the great operative difficulties and by a general belief in the futility of such an extensive procedure.

The purpose of this study is to determine from a review of the literature and an analysis of the cases of the Johns Hopkins Hospital the true value of castration and to compare this with the results that have followed the use of the radical operation in the forty-odd cases reported in the literature. Such an analysis has never been made and should give an excellent opportunity of

determining the significance of preoperative duration and rapidity of growth of the tumor to the onset of glandular metastases and the significance of such metastases with respect to a choice between the two methods of operative treatment. The particular object is to find out if the radical operation is ever justified, and if so, under what conditions.

HISTORICAL

The study of testicular tumors has been chiefly confined in the past to pathologic considerations. From this point of view these tumors are of unusual interest as they show cells and tissues of almost every conceivable variety. The subject was in hopeless riot until the appearance in 1906 of the masterly pathologic and clinical study of 100 cases by Chevassu¹ which simplified the classification to practically only two types of tumor of almost equal frequency, namely, the

* Read before the Section on Genito-Urinary Diseases at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Chevassu, Maurice: *Tumeurs du testicule*, thesis, Paris, 1906.

Fig. 4.—Tuberculous lymph-glands at A.

seminoma or seminal epithelioma and the mixed tumor or teratoma. In 1911 Ewing gave the first convincing and lucid explanation of these tumors, grouping them all into the one great class of teratoma or derivatives. Pure-celled fibroma, leiomyoma and adenoma do rarely occur as do primary lymphosarcoma and spindle-cell sarcoma, which latter are of very uncertain origin and all are so infrequent as to be of no clinical importance. All so-called alveolar, perivascular and other forms of sarcomas are not sarcoma at all but are of epithelial and of teratomatous origin. These findings have since been confirmed by Wilson and others, so that clinically all primary new growths of the testicle are teratomatous in origin and of two main types, either pure round-cell embryonal carcinoma or simple or complex teratoma.

The published mortality results following orchidectomy for teratoma testes are very scanty and for the most part very unsatisfactory. Kober² in 1899 in an analysis of 113 cases collected from the literature found an ultimate mortality of about 80 per cent. with a three-year time limit. Chevassu³ gave an 81 per cent. mortality with a four-year time limit. Codman and Sheldon⁴ reported this year 41.07 per cent. cures in a series of sixty-four cases. The average time of those living is given as nine years, with extremes of two and twenty-eight years. The number of patients living less than four years is not stated. All cases are considered as malignant out of deference to Ewing's views.⁵ The pathologic reports of the Massachusetts General Hospital for the last forty years have been accepted without a personal study, and seventeen of the cases had merely a clinical diagnosis of malignancy and no pathologic report.

The general knowledge of a high mortality-rate and the feeling of incompleteness by simple orchidectomy have led surgeons to attempt more radical methods of treatment. Stimson⁶ in 1897 advocated a high excision of the cord and removal of the inguinal glands. Villar⁷ in 1901 extended the inguinal incision and with his patient in

the Trendelenburg position was enabled to strip up the peritoneum for a short space and to remove the spermatic vessels higher up and also the lymphatics of the iliac fossa. Similar operations have been variously performed, but the results show no improvement over simple castration and for the reason that they do not attack the primary lymphatics of the testicle.

The primary lymph-glands into which the lymphatic channels of the testicle drain were first established by the experimental work of Most⁸ in 1899. The topography of this system through additional researches of Cuneo,⁹ Jamieson and Dodson¹⁰ and others is now definitely known. The first nodes reached by the lymph-flow from the testicles number four to five on each side (Fig. 1). Those for the right testes lie in the loose adipose tissue on the vena cava, sometimes between it and the aorta, for the left, on or by the side of the aorta. Not infrequently a gland is found in the region where the ureter crosses the iliac, and occasionally there is a gland at the bifurcation of the aorta. The glandular

zone is generally limited above by the renal pedicle and below by the bifurcation of the aorta. Secondary glands lie along the internal and external iliac vessels and deeply between and beneath the vena cava and the aorta. Most found no barrier between the testicle and the thoracic duct except these lumbar nodes, which are an imperfect guard, as he was able to send the injecting fluid all the way up from the testicle to the subclavian vein, which may be the route followed in general metastases. These anatomic relations have been sufficiently confirmed by post-mortem and clinical findings, which have also shown the imperfect and limited drainage capacity of these primary nodes. Secondary glandular metastases very quickly occur and general invasion of other organs is not uncommon. The only hope, therefore, from a radical operation

would be the removal of the primary nodes before secondary involvement has occurred to the deeper glands whose anatomic position is such as to render their removal out of the question.

Unsuccessful attempts have been made by Kocher, von Bergemann and others to remove abdominal metastases, and it is now universally recognized by surgeons that operative intervention is contra-indicated in every case in which involvement of the lumbar glands can be determined clinically. Roberts of Philadelphia was the first to undertake (in 1901) the removal of the lumbar lymph-nodes in a case in which clinically they were not involved. He elected a median abdominal incision, opened the peritoneum, encountered insurmountable difficulties, and his patient died in a

Fig. 1.—Primary lymph-nodes of the testicles. (From Spalteholz and dissections.)

2. Kober, G. M.: *Sarcoma of Testicle*, Conclusions based upon 114 cases, *Am. Jour. Med. Sc.*, 1899, cxvii, 535.

3. Chevassu, M.: Deux cas d'épithéliome du testicule traités par la castration et l'ablation des ganglions lombo-aortiques, *Bull. c. mém. Soc. de chir.*, Paris, 1910, xxxvi, 236; *Le traitement chirurgical des cancers du testicule*, *Rev. de chir.*, 1910, xli, 628, 886; *Med. d. accid. du travail*, Paris, 1910, viii, 628, 887; *Le diagnostic clinique des cancers du testicule*, *Presse méd.*, 1910, xviii, 363.

4. Codman and Sheldon: *Prognosis of Sarcoma of the Testicle*, *Boston Med. and Surg. Jour.*, 1914, clxx, 261.

5. Ewing, J.: *Teratoma Testes*, *Proc. N. Y. Path. Soc.*, 1909-1910, New Series, ix, 83; *Teratoma Testes and Its Derivatives*, *Surg., Gynec. and Obst.*, 1911, xii, 230.

6. Stimson, J. C.: *A New Operation for Malignant Disease of the Testicle: The Necessity of a More Extensive Operation than Castration for Carcinoma, Sarcoma, etc., of the Testicle*, *Med. Rec.*, New York, 1897, lii, 623; *N. Albany Med. Herald*, 1897, xvii, 537.

7. Villar, F.: *Méthode rationnelle pour pratiquer la castration dans les cas de tumeurs du testicule*, *Ann. Soc. de med. de Gard*, 1902, lxxxi, 183; *Cancer de testicule et kyste du cordon; castration large après section de la paroi antérieure du canal inguinal*, *Mém. et Bull. Soc. de med. et chir. de Bordeaux* (1902) 1903, p. 295.

8. Most: *Ueber die Lymphgefässe und Lymphdrüsen des Hodens*, *Arch. f. Anat. u. Entwicklungsgesch.*, 1899, p. 113.

9. Cuneo, B.: *Note sur les lymphatiques du testicule*, *Bull. et mém. Soc. anat. de Paris*, 1901, lxxvi, 105.

10. Jamieson and Dodson: *The Lymphatics of the Testicle*, *Lancet*, London, 1910, i, 493.

few days from peritonitis. His misfortune has seemed to discourage all other American surgeons, as none has since undertaken the removal of this gland area. Gregoire¹¹ of Paris in April, 1905, following an experience in the removal of the lumbar glands for tumor of the kidney, was led to undertake a radical procedure for teratoma testes by an almost identical extraperitoneal method of approach. The first case proved inoperable, but in August of the same year Cuneo successfully performed the operation and removed four enlarged lumbar glands, one of which showed teratomatous invasion, and the man remained well and without recurrence for three years, when he was lost from observation. The operation with slight modifications has been performed forty-one times in France, four times in England and once in Italy. The evidence in favor of an operation which is apparently so extensive will necessarily have to be very convincing before its general adoption.

It will be of value first, in view of the few and for the most part unsatisfactory statistics on the subject, to add additional data in regard to what may be justly expected of simple castration in the treatment of malignant disease of the testicle.

ANALYSIS OF CASES IN THE JOHNS HOPKINS HOSPITAL

The present study is based on a series of thirty-two patients, twenty-five of which were admitted to the Johns Hopkins Hospital—two of these were not treated—and in seven operation was performed outside and the specimens sent to the laboratory of Dr. Joseph C. Bloodgood for diagnosis.

Seven of the tumors occurred in undescended testicles, which fact supports the accepted view that malignancy is relatively more common in cryptorchids than in normal men.

The ages ranged between 24 and 67 years, with an average of 39 years (age not stated in three). Eight of the patients were under 30.

In eleven of the cases some injury preceded the onset of the disease, but owing to the almost universal occurrence of injury of this kind in all men, it is difficult to place its significance.

The duration of the disease from the time it was first noticed until orchidectomy was done varied from one month to twenty years. The onset is questionable in the cases giving a long duration. In these cases there is commonly a history of injury followed by enlargement which would remain stationary or gradually increase for a time and a few weeks or months before admission would show a sudden and rapid growth with possibly pain or discomfort. The true onset of malignancy cannot be stated. The four cases of the series in which the patients are still alive had a preoperative duration of four months, two years, six years and twenty years, respectively, and of the two

latter cases which give the longest duration of the series one patient was kicked in the scrotum with gradual enlargement for the six years following and the other had had gradual enlargement since childhood. The duration, therefore, gives no clinical indication of the character or degree of malignancy.

The pathologic material has been personally examined in twenty-two of the cases. Parts of all of these showed a picture typical of these testicular tumors and not duplicated by any other tumor; in the presence of characteristic large round cells in a lymphoid or fibrous stroma. In ten of the cases in addition to these typical areas of carcinoma cells there were found, either alone or in association, areas of cartilage or of cystic, glandular, myxomatous, fibromuscular or embryonic connective tissues, which places them in the group of teratomas. The round cells of the simple-cell tumors were in all cases larger than lymphoid cells, and the round-cell picture in the two types of tumors was absolutely identical. In the majority of the tumors in which cartilage was found it was present in small areas and might easily be overgrown by the more active carcinoma-cells, and this may have occurred in these pure-cell tumors. It is very possible also that areas of

mixed-cell types may have been overlooked, as serial sections were made in no case. In six of the ten cases in which no material was available for study, a previous microscopic diagnosis of alveolar or round-cell sarcoma had been made. In view of the fact that the previous diagnosis of the twelve pure round-cell tumors and of three of the mixed tumors had been some form of sarcoma, it is to be supposed

that these six cases were either teratomas or a one-sided development of a teratoma. These findings only confirm those of Ewing, namely, that clinically all malignant tumors of the testicle are teratomatous in origin.

There were a number of cases with the clinical diagnosis of malignancy in which the removed testicles, on subsequent microscopic examination, proved to be the seat of a syphilitic orchitis.

Metastases were clinically present at the time of the operation in four of the patients, all of whom died of carcinomatosis. Owing to the deep position of glandular metastases and their non-recognition until they have attained a considerable size, it is not possible to establish any clinical relation between the onset of such metastases and the duration of the disease, concerning which there is almost always also some doubt. Seventeen patients had retroperitoneal glandular metastases at death. In eight death is mentioned as due to general carcinomatosis, and presumably lumbar metastases were present. Necropsies were performed in three cases, lumbar metastases found in all, nodules in the liver in all and in the lungs in two.

The ultimate result is known in twenty-four cases, of which twenty patients are dead and four living. Of the eighteen cases in which the result is known and the specimens have been examined, nine are pure

Fig. 2.—Dorsolateral position and line of incision for radical operation.

11. Gregoire, R.: Considerations sur l'état des ganglions dans le cancer du testicule, *Arch. gen. de chir.*, 1908, ii, 1; Obs. in thesis of Chevassu, 1906, 182; in *Rev. de Chir.*, 1910, xli, 648, 654, 656.

round-cell carcinomas and nine are teratomas. Of the former group two patients are alive, twelve and thirteen years, and none of the seven patients that are dead lived over two years. Of the latter group all are dead except one patient, who is now alive for only sixteen months. One patient lived for three years, another for nine years and seven months. This case is most unusual with a history of injury forty years before the onset of tumor which preceded orchidectomy by three years. A letter from the patient six years later (1906) stated that he was well, and a letter from his wife this summer states that he died of "abdominal cancer," March 3, 1910, nine years and seven months after castration. These facts indicate that the mixed type of tumors are more malignant, though possibly of a slower form of growth, than the pure-cell carcinomas, although, since all tumors are teratomatous in origin, such a differentiation is more or less arbitrary.

The result in the four cases in which the material was not available for study but in which a previous diagnosis of sarcoma had been made gives one living now almost twelve years, and three deaths, one, two and eight years, respectively, after castration. The latter case is another remarkable instance of the long duration of life that is possible after castration for teratoma testes with ultimate death from cancer metastases. It is that of a cryptorchid who three years following double castration, at which time both testicles were found to be the seat of "sarcoma," began to have abdominal symptoms, but lumbar glands were not palpable until after six years, and death did not occur until eight years after the operation. Bloodgood places the time limit for cure in cancer of the breast at eight years, and it would seem that the limit of four years as placed by Chevassu, while only exceptionally exceeded, is not an absolutely safe period in cancer of the testes. One of Chevassu's own patients died a full four years after operation; but, as Andrews formulates it:

The risk of recurrence in malignant growths increases as the square of the time of growth; or, conversely, the risk of recurrence diminishes in the ratio of the square root of the time after incidence.

With one exception in which death resulted a few days after operation from pulmonary embolus, all of the patients, so far as can be determined, died of cancer. Excluding this one case of embolus and the four cases in which metastases were already present at the time of operation, the series shows a cure from castration in only 15 per cent. of the cases, a high mortality-rate of 85 per cent.

ANALYSIS OF CASES TREATED BY RADICAL OPERATION

The records of forty-four attempts radically to remove the primary preaortic lymph area in treating

testicular tumors have been collected from the literature. Gregoire furnishes information regarding two additional and unpublished cases. This material offers an excellent opportunity because of the exposure at operation to determine the relation of the duration, size, rapidity of growth and the character of the tumor to the onset of the glandular metastases and their early location. Inasmuch as thirty-two of the operations were performed before 1911, there has been sufficient time to allow of a comparison of the results with those following castration. Several French theses have been written on the subject (Calin,¹² Beckerich,¹³ Moscarennas¹⁴), but in none of these are the cases analyzed to show the operative or ultimate mortality, the relative number of cases which had at the time of the operation early metastases and the proportion of these in which these metastases, although not possible of recognition clinically, were so extensive as to be inoperable.

The technic of the operation from a study of the descriptions of the various operators and from per-

sonal dissections from which the accompanying drawings have been made is briefly as follows: The operation is usually performed in two stages, inguinal and abdominal. The first stage is that of ordinary castration and it is extremely important that the testicle be carefully examined at this time and the diagnosis definitely confirmed before proceeding to the extensive abdominal part of the operation. The fact that over 7 per cent. of the few cases so far subjected to the radical method of treatment were found on subsequent examination of the specimens to have had a syphilitic orchitis shows the importance of this preliminary study.

For the second stage of the operation the position of the patient is of considerable importance. It should be a bent dorsolateral one with the patient turned partly on his back and resting on a pad, under the costal margin with shoulder and hip on the table. This raises the spine to conform to the line of the incision and allows a good exposure of the deep abdominal vessels (Fig. 2). The skin incision is extended from the upper end of the inguinal cut parallel to Poupart's ligament, curving upward in the axillary line at about 4 cm. below the anterior superior spine of the ilium to end at the costal margin. In fat, thick-bellied men, the upper end of the incision may be extended along the rib margin either anteriorly (Gregoire, Fredet¹⁵) or posteriorly (Cuneo). The

Fig. 3.—Peritoneum stripped back showing lymph area to be removed.

be a bent dorsolateral one with the patient turned partly on his back and resting on a pad, under the costal margin with shoulder and hip on the table. This raises the spine to conform to the line of the incision and allows a good exposure of the deep abdominal vessels (Fig. 2). The skin incision is extended from the upper end of the inguinal cut parallel to Poupart's ligament, curving upward in the axillary line at about 4 cm. below the anterior superior spine of the ilium to end at the costal margin. In fat, thick-bellied men, the upper end of the incision may be extended along the rib margin either anteriorly (Gregoire, Fredet¹⁵) or posteriorly (Cuneo). The

12. Calin, Paul: Du Traitement chirurgical du cancer du testicule, (extirpation des ganglions ilio-lombaires), Lyons, 1911, 74, p. 8.

13. Beckerich, Louis-Achille: De l'ablation des ganglions lombaires aortiques comme complément à la castration pour néoplasme testiculaire, Nancy, L. Bertrand, 1911.

14. Moscarennas, C. O.: Contribution à l'étude du traitement du cancer du testicule, Paris, 1912.

15. Fredet, Pierre: Obs. in Bull. soc. chir., 1910, 245, and Rev. de Chir., 1910, xli, 661.

muscle-fibers and fascia are divided in a line with the skin incision down to the peritoneum, which is gently stripped back so as to expose the lower pole of the kidney and the psoas muscle. A choice is given the operator between starting above at the renal pedicle and working down or beginning below in the inguinal ring and stripping the cord and vessels up toward the lumbar region. The former method of attack appears more rational, and in the dissections by traction on the spermatic vessels at the external ring was easily accomplished. Figure 3 indicates the exposure of the lumbar field and Figure 4 the appearance after the lumbar and iliac fossae have been stripped. In cleaning the anterior surface of the aorta the inferior mesenteric artery must be protected. The spermatic vessels and the ureter usually remain attached to the peritoneum when it is stripped up in the iliac fossa, and this region should be carefully cleaned as metastases often occur where the ureter crosses the iliac vessels. The dissection should also be carried up so as to include the region about the bifurcation of the aorta. The vas deferens is readily located and divided as it leaves the internal ring. The clean removal of the vascular and lymphatic layer as outlined is far superior to the palpation and individual removal of single glands, as is sometimes described. The operation for right-sided involvement offers greater difficulties in that the area to be cleaned covers the vena cava. Good and sufficient drainage should be established owing to the large lymph area removed.

From the accounts of those who have performed the operation it presents neither the difficulties nor gravity that would be expected. The patients apparently stand the operation well and show no evidence of shock, and the convalescence is relatively short. The long incision is objectionable because of the danger of hernia and of the division of numerous nerves. The tenth, eleventh and twelfth dorsal nerves are always cut, and usually the lower branch of the genitocrural. Partial paralysis of the abdominal muscles results and difficulty with the bowels is encountered during convalescence. Chevassu has shown by faradic and galvanic tests that this paralysis is only temporary. There have been no fatalities from postoperative hemorrhage or other complication as a result of injury to the large abdominal vessels. Five of the patients died of postoperative complications, three of pneumonia and two of peritonitis, an operative mortality of 11 per cent., which, considering the newness and nature of the operation, is surprisingly low.

With the exception of two cases (André,¹⁶ Georgesco and Savesco,¹⁷ Case 2) there was no clinical evidence of lumbar metastases before operation. Three

of the cases (Cuneo, Case 2, Marion, Mercadé) were mistakes in diagnosis, the testicles in each being found on subsequent examination to be the seat of a syphilitic orchitis. Of the forty-two remaining patients, twenty are living, nine for over two years; four for over four years, the longest for four years and ten months, the shortest for one month. The average time since operation on the twenty patients who are reported alive is one year and eight months. Sixteen, or 41 per cent., have died of cancer, all within one year except two, one of whom (Gregoire, Case 1) died thirty-one months and the other (Chevassu, Case 2) four years after operation.

The duration of the disease before operation varied between two months and twelve years, with an average of fourteen months. Twenty-one of the cases had a duration under one year, and twelve of these under six months. Only three cases had a duration of over three years. While lumbar glands were palpable in only two cases before operation, twenty-two, or over 50 per cent., of the cases showed cancer invasion

of the lumbar nodes that were removed at operation, and in eleven of these the involvement of the gland area was so extensive as to be inoperable. In eight of the cases in which numerous lumbar glands were removed, these on subsequent microscopic examination in no case showed cancer invasion. In three cases no lumbar glands at all were found at operation. The twenty-two cases with malignant involvement of the lumbar nodes removed at operation had a preoperative duration of from two months to twelve years or, omitting the case with a duration of twelve years, which is the longest in the series and questionable, an average of fifteen months. On the other hand, the eleven cases in which no lumbar involvement was found had a preoperative duration of from three months to fifteen months, with an average of eight months. This indicates that the preoperative duration has considerable significance

with respect to the onset of glandular metastases. The significance, however, cannot be definitely determined, as many cases of short duration are seen to have extensive metastases, whereas cases of an apparently long existence may have no metastases. The chances, nevertheless, of metastases not having occurred, are greatly in favor of a case with comparatively short duration. All of the eleven patients in whom the glandular involvement was so extensive as to render its complete removal impossible are dead, except two who had been observed for only one month at the last report. Of the other fourteen patients with glandular involvement but in which the gland area supposedly was completely removed at operation, seven are living, one died of pneumonia seven days after operation, and six died of cancer recurrence.

Of the eight patients with clean glandular removal but in which no involvement could be found, five are living, and three died of cancer. Two of the three

Fig. 4.—Lumbar and iliac fossae stripped clean of glands and fascia with the spermatic vessels down to inguinal ring. Vas deferens entering pelvis at point where it is divided.

16. André: Cancer du testicule avec extirpation des ganglions lombo-aortique, *Revue méd. de l'est.*, 1912, xlv, 420.

17. Georgesco, G., and Savesco, V.: Etude anatomique et chirurgicale sur trois cas de cancer du testicule, *Jour. de Chir. de Bucarest*, April, 1914, iv-vi, 226.

patients in whom no glands at all were found are dead. Of the six cases in which no mention is made of glands, two patients are dead, one and twelve months, respectively, after operation; three are living, one, twelve and forty-eight months, respectively, and the result in one, presumably alive, is not mentioned.

Obviously all cures in those patients who had cancer involvement of the lumbar glands that were removed at operation will be directly due to the radical procedure, and just as obviously the radical procedure will be able to cure in only those early cases in which the invasion has not spread beyond the primary lymph zone. Simple castration will be of no benefit in either case, and will cure in only those very early cases in which the disease is confined to the testicle proper. Of the six patients living who had glandular metastases removed, one, in whom two of the glands removed at operation showed marked invasion, is now alive and well almost five years since the removal of these glands, three other patients are alive and with no evidence of recurrence for almost three years from the time malignant lumbar glands were removed, and the two other patients were alive after operation eight and one months, respectively, at the time of the last report.

SUMMARY AND CONCLUSIONS

1. Orchidectomy will cure from 15 to 20 per cent. of teratoma testes. Obviously a cure is possible only when the testicle is removed before the onset of glandular or other metastases.

2. A cure cannot be assured until nine years after operation, although the danger of recurrence after four years is very small (only three cases reported) and progressively diminishes.

3. Cancer of the testicle metastasizes in practically every case first and primarily to a limited zone of lumbar lymph-nodes which lie on the aorta for the left testicle and on the vena cava for the right, between the bifurcation of these vessels and the renal pedicle. Communication between these two groups and to deeper or more distant glands occurs only secondarily.

4. Involvement of these primary lymph-nodes may occur early or late, and the preoperative duration of the tumor in the testicle, its rapidity of growth or its size give no definite clinical indication of the onset or extent of such metastases, but the probabilities increase the longer the duration and the more rapid the growth.

5. Pathologic differentiation of tumors of the testes into embryonal carcinomas and mixed-cell types is more or less arbitrary as both are teratomatous in origin; but the former appears to be definitely less likely to metastasize, although more rapid in its growth. There are fewer cures among the cases of teratoma, although these give the longest duration before death.

6. The primary lymph-nodes are a very imperfect guard against secondary invasion, and metastases to other gland areas by way of efferent lymph-channels or by blood-vessels to thoracic or abdominal organs may occur early. Surgical treatment is of no avail after these secondary metastases have occurred. The only hope, therefore, in a radical operation is the removal of the testicle with its primary lymph area before the disease has spread beyond this zone.

7. The experience of various surgeons in a total of forty-six cases has demonstrated in suitable cases the feasibility and technical ease of the radical operation with a combined surgical mortality in all cases of only 11 per cent.

8. Radical operation should never be undertaken when lumbar metastases are recognizable clinically, and is applicable only in the fairly early cases in which the disease is apparently limited. Owing to the deep position of the glands, these cases cannot always be differentiated before operation, so that every case, in which clinically there is no invasion, is suitable for radical treatment. The operation should never be performed until after the diagnosis is confirmed.

9. Sufficient time has not elapsed and the cases are so scattered that it has not been possible to get the ultimate result in all of the patients treated radically. Forty-six per cent. are alive, one for five years; one for four years; five for almost three years; two for over two years and eleven for one year or less. There is a probable cure in at least four cases which had lumbar glands invaded with cancer at the time of the operation. Simple castration could not have benefited any of these cases, and their cure is directly attributable to the early and clean removal of the affected lymph area.

10. In conclusion, therefore, it may be stated that the early removal of the testicle with its primary lymph zone is the rational method of surgical treatment of teratoma testes, but the extensive nature of the operation and the fact that almost one-third of the cases thus treated were found to be inoperable warrants a very careful selection of suitable cases.

I wish to acknowledge thanks to Dr. W. S. Halstead for the privilege of using the material of his surgical clinic, to Dr. J. C. Bloodgood for the valuable material of the surgical pathologic laboratory, and to Drs. Gregoire, Pringle, Chevassu, Marion and others for data in regard to cases operated on, and particularly to Dr. Hugh H. Young for his generous kindness in furnishing financial and advisory assistance and for the use of the material of the genito-urinary clinic.

ABSTRACT OF DISCUSSION

DR. HUGH YOUNG, Baltimore: Dr. Hinman has thoroughly studied all our pathologic records, and I think has made all of us realize that we shall have to change our text-books and do a far more radical procedure than in the past. On account of such work as Dr. Hinman's we are compelled to note a series of bad results that we did not realize were occurring.

DR. FREDERICK W. ROBBINS, Detroit: I wondered while I listened to Dr. Hinman's paper if he had entirely forgotten the work of Coley in connection with his serum in these cases. About five or six years ago I reported a case that shows, as I believe, the result of the use of the double injection of the erysipelas and prodigious bacilli. A man had a very rapidly growing tumor of the testicle, probably a teratoma, although at the time I thought it was a sarcoma, which I removed without any very extensive dissection. The tumor was about as large as my fist. That the tumor was malignant I think is proved from the fact that within ten days after it was removed another growth was formed as large as my fist. I then dissected out, very carefully, the contents of the scrotum, and without opening the internal abdominal ring went up as high as I could to get everything out, and the wound looked perfectly clean. Inside of ten days the growth was again forming so that you could see it increase in size every day. I began the injection of the double bacillus. Within two days the growth had stopped and then gradually disappeared. He was under treatment about three weeks, getting a reaction at every injection. I began with a small dose and increased the dosage. The first injection caused elevation of temperature to about 103, as I remember it, but gradually it required a larger and larger injection to get a reaction, until in about two weeks the maximum

dose was given. The growth entirely disappeared. The other day I heard from him, and he is reported to be perfectly well. We should not forget that there are such cases as I have had and as Coley has reported, which are wonderfully helped and probably cured by the double bacillus injection.

DR. EDWARD L. KEYES, JR., New York: In two cases I have endeavored to follow out practically the technic suggested by Dr. Hinman of clearing up the space between the ureter and the aorta as far as the kidney, and in both instances I have found the veins implicated in the disease, extending to and beyond the kidney. In one case there was a large mass of secondary glandular involvement even above the kidney, and in the other there was simply a venous involvement up to the kidney. Several other patients I have seen die from metastasis extending so rapidly after the disease once got started and of such wide distribution that it seemed to me that, taken in connection with the known fact that the veins of the pelvis and abdomen are frequently involved in the growth, the metastases occur by the vascular instead of the lymphatic route in the large majority of cases. If that is the case, I question whether an extensive dissection is going to help us revise our mortality statistics. I fancy the real thing is to get at the cases early, before vascular metastases have occurred and not to pinch the vessels when you are examining them.

DR. M. KROTOSZYNER, San Francisco: In connection with Dr. Keyes' remarks, I believe that the salvation of our patients does not lie so much in the radical operation as in the early diagnosis. I do not think there is any condition in the genito-urinary tract so difficult to diagnose as enlargements of the scrotum involving the testicle. It is in these cases that the Wassermann reaction has complicated the diagnostic difficulties. Any physician who has seen many of those doubtful tumors will admit that three large conditions loom up right from the start—tuberculosis, tumor and syphilis—and he will not be willing to put the patient on the operating-table before he has at least satisfied himself that a diagnosis of syphilis can be excluded. I have seen cases in which the Wassermann was slightly or even strongly positive and in which afterwards the diagnosis of primary carcinoma of the testicle was verified pathologically. What are we going to do? In one case three months had been lost by this means, not only in my hands, but in the hands of my predecessors. I think a means ought to be established by which we are enabled as early as possible to make the diagnosis. I think then the result of our operative procedures will be better.

DR. FRANK HINMAN, Baltimore: With regard to Dr. Keyes' statement concerning vascular and glandular involvement, forty-six of these cases, I think, gave a very clear indication as to the first metastasis of these tumors. In twenty-two cases the lymphatic glands were first involved at the time of operation. In eleven of these twenty-two cases the disease was so extensive as to render them inoperable. This fact, however, I think does not detract from the object of the radical operation, because four of these patients were apparently cured. An early diagnosis, of course, is the all-important thing in the treatment, but it has been shown that castration will only cure from 20 to 50 per cent. of these cases, and the radical operation, from a surgical point of view, is perfectly feasible and technically not difficult. So that in every case the lymphatic region should be explored. There certainly will be a small proportion of patients who will be cured by the radical operation who otherwise would certainly die.

"Idiopathic" Insomnia.—Insomnia is a symptom always; it is never a disease. In many text-books there is a reference to "idiopathic insomnia." That is the insomnia described by the ignorant man. We are all ignorant on this subject, and the best thing is to admit our ignorance, rather than trying to satisfy our consciences by describing it as idiopathic, or putting a long title to it or classifying it, and concluding that all is well.—H. Crichton Miller, *Medical Press and Circular*.

DIVERTICULA OF THE URINARY BLADDER

WITH REPORT OF CASES *

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The increasing literature regarding diverticula of the urinary bladder and the frequent reports of cases which are now appearing indicate, in my opinion, not that this condition is occurring more frequently than formerly, but that it is now being more accurately diagnosed and that its treatment is now yielding more satisfactory results. Very complete reviews of the literature on this subject have been made by Fischer¹ and by Lerche,² who show that opinions regarding the exact etiology of diverticula still vary. Some writers believe that diverticula are always congenital while others contend that they are acquired, the point of differentiation being the presence or absence of muscular fibers in the walls of the sac forming the diverticulum. If muscular fibers be present it still is considered by many that the diverticulum is of congenital origin. If, however, the sac be formed only of mucous membrane, that is considered evidence that the diverticulum is acquired. It has been shown recently, however, that in practically all cases some muscular fibers are found in the sac wall, though they often are very much attenuated.

It seems to me, however, from the clinical aspects of the cases that have come under my observation and are here reported, that these diverticula were acquired, and the argument, which also applies for most diverticula, is: 1. They scarcely ever are found in the very young, but for the most part in persons past middle life, a time at which obstruction to urinary outlet most frequently occurs. Necropsies on children do not show this condition, or at least its presence is not mentioned in most post-mortem records. Such anomalies as hour-glass or double bladder which are occasionally reported at post-mortem findings in children are generally associated with double urethras or multiple ureters and other abnormalities and should not be considered identical with true clinical diverticula. 2. They very seldom occur in women, the ratio being about one to ten. 3. In most cases the bladder wall is much thickened, a condition present in most cases indicating obstruction to the urinary outlet, which produces more or less retention. In the one case of a woman in my own series a urethral caruncle was present which caused her so much pain that she refrained from voiding as much as possible and never completely emptied her bladder.

Even Englisch, as quoted by Fischer, believes that the so-called congenital diverticula are "based on the presence of some obstacle to the outflow of urine, in consequence of which the weak points of the muscular arrangement of the bladder give way. These obstacles may be produced by inflammatory conditions of the bladder or urethra during intra-uterine life but which have healed up, leaving no vestiges after birth."

That there probably is some congenital condition of the bladder wall which under certain conditions, such, for example, as obstruction and overdistention for a

* Read before the Section on Genito-Urinary Diseases at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Fischer: Congenital Diverticula of the Bladder, Surg., Gynec. and Obst., 1910, x, 156.

2. Lerche: The Surgical Treatment of Diverticula of the Urinary Bladder, with Report of a Case and a New Device for Facilitating the Operation, Ann. Surg., 1912, lv, 285.