HYDROCELE OF THE CANAL OF NUCK

REPORT OF SEVENTEEN CASES

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SINCE Coley's[3] comprehensive review of the literature and report of 30 new cases, in 1892, the literature on the subject of hydrocele of the canal of Nuck has been limited mostly to single case reports and the various features of the condition have been neglected. Price,[11] in 1926, expressed the belief that the condition was sufficiently rare to warrant reporting a single case, and he was able to find only eight references in the literature between 1908 and 1926. In the Quarterly Cumulative Index Medicus, since 1926, only three references to it are listed; two are reports of a single case and the third is to an article under the general title, "Hydrocele of Nuck in Japanese Women."

The number of previously reported cases is not large. Wechselmann,[15] in 1890, was able to collect only 62 cases from the literature, and Coley[3] added 30 cases to this list, in 1892. Coley,[4] in 1908, stated that 160 cases of hydrocele of the canal of Nuck had been encountered at the Hospital for Ruptured and Crippled between 1890 and 1908. Since 1892, probably less than 100 cases have been reported. This statement is based on a rather careful search through the "Index-catalogue of the Library of the Surgeon General's Office" and the Index Medicus, and the careful checking of all references available. Several German theses on the subject that have appeared during this period were not available nor were a few reports in more obscure journals. However, we feel that an estimate of less than 350 reported cases is probably not too high. We were unable to find any statistics concerning the incidence of the condition or data relative to the proportion of inguinal herniae complicated by hydrocele among women.

The present communication was undertaken because of the recent lack of interest in the condition, as reflected by references in the literature, and to report the cases encountered at the Mayo Clinic.

Development.—Most writers on the subject are agreed that the cystic tumors which accompany the round ligaments through the inguinal canal of women are the exact counterpart of encysted hydroceles of the cord in the male, and result from the accumulation of fluid in a persisting diverticulum of Nuck, which corresponds to the vaginal process of the peritoneum in the male. In keeping with this conception of origin of the cysts, they are usually

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found accompanying the round ligament but not originating within it, and they are lined with a pavement epithelium similar in all respects to the cells lining the peritoneal cavity. As in the male, the more common form does not communicate with the peritoneal cavity but Coley has reported cases in which such communications exist. In most textbooks essentially the same explanation of the condition is given. Thus Graves[7] considered hydrocele of the vulva to be "a retention cyst due to the upper closure of the processus vaginalis peritonei which runs along the round ligament into the labium majus." Davis[5] stated: "Sometimes a finger-like extension of the peritoneum resembling the vaginal process in the male" accompanies the round ligament through the inguinal canal and the accumulation of fluid in this leads to the formation of the hydrocele.

Other theories to explain the development of these cysts have been proposed in the past. Gebhard[6] suggested that they originated from embryonic rests in the round ligaments, and Weber[14] thought that they could result from the persistence of the original hollow condition of the round ligament. Brothers[1] considered these older theories more completely but they have been largely abandoned at present. It is evident that when a cyst does not have a simple lining of flat cells, it cannot be considered to be an hydrocele and some other explanation for the presence of the epithelial lining must be sought. In most cases reported recently, in which a definite epithelial lining has been found, a cystic adenoma has been present.[10] Further discussion of this point is beyond the scope of this report. However, other cysts than hydroceles do exist in the inguinal canal and in the vicinity of the round ligaments so that microscopic examination of the wall of the cyst is necessary for exact diagnosis.

Classification.—The most common type of hydrocele of the canal of Nuck corresponds to the encysted hydrocele of the cord in the male. There is no communication with the peritoneal cavity and the cyst may be found anywhere along the course of the round ligament from the internal ring to the vulva. Such hydroceles may be multilocular and most of the larger ones have incomplete partitions.

A second type corresponds to the congenital hydrocele of the male with a communication between the hydrocele and the general peritoneal cavity. Two of the cases collected by Coley were of this category without question and several other cases in his series were probably of this type.

Hydroceles of hour-glass type have been found among women also. Halstead and Clark[8] reported a case of a bilocular hydrocele in a Negress, age 42. The constriction was situated at the internal ring where the round ligament entered the lower sac and, in the same region, there was a free communication with the general peritoneal cavity. The upper sac was intra-abdominal but outside of the peritoneum, whereas, the lower sac was in the inguinal canal and simulated an hernia. The lower sac contained several septa and a bean-shaped free body. Halstead and Clark also referred to a similar case reported by Thierhaber,[13] in which there was no communication with the peritoneal cavity, and to a third, reported by Chiari.[2] In both of these cases inflammation

in the intra-abdominal portions of the sac gave symptoms of serious intra-abdominal disease which were interpreted, in both cases, as intestinal obstruction.

The original classification of Regnoli included hydroceles developing in an hernial sac as well as the encysted and diffuse hydroceles of the cord and the congenital type.

Diagnosis.—The chief importance of the condition lies in the differential diagnosis, chiefly from hernia. Coley believed that the diagnosis was possible in most cases and emphasized the characteristic elastic feel of the cyst, along with its position at the subcutaneous inguinal ring. He further pointed out that hydroceles of the canal of Nuck appear first at the subcutaneous inguinal ring and only later reach the vulva. A careful history, therefore, should serve to distinguish hydrocele from vulvovaginal cysts. Others have emphasized the lack of an impulse on coughing and the fact that the supposed hernia cannot be reduced.

In the 17 cases reviewed from the Mayo Clinic, the differential diagnosis between hernia and hydrocele in the female was very difficult. In most of the cases, rather small tumors were so well confined to the inguinal canal that they could not be palpated readily. Many of the hydroceles were associated with hernia and this confused the question of whether the mass could be reduced and whether there was an impulse on coughing. In some cases the cysts were small enough to be freely movable and to be forced toward the subcutaneous inguinal ring when the patient stood or strained. In virtually all such cases the findings indicated to the examiner the presence of a reducible hernia.

In cases in which the hydrocele had extended beyond the subcutaneous inguinal ring toward the vulva, the findings were more diagnostic. Palpation was much facilitated and the mass could be transilluminated. It was also evident that these tumors could not be reduced completely and that they were not incarcerated herniae.

It was often impossible, particularly among obese patients, to place the hydrocele definitely in the region of the subcutaneous inguinal ring rather than over the femoral ring. It was also impossible to distinguish, with complete certainty, small hydroceles from intrinsic tumors of the round ligament, such as fibromata and lipomata.

A clinical diagnosis of hydrocele of the canal of Nuck presents no particular difficulty when the hydrocele is not associated with hernia or when it is large enough to permit transillumination, careful palpation, and the proper determination of its position in relation to the femoral and subcutaneous inguinal rings. In addition, the history of a nontender, irreducible tumor which is slowly increasing in size would make the diagnosis virtually certain. However, smaller hydroceles, particularly those in association with hernia and those in obese patients, probably cannot be differentiated from other tumors in the inguinal and femoral regions.

Data on seventeen cases.—Seventeen cases of hydrocele of the canal of Nuck proved at operation have been encountered at the Mayo Clinic. Although the condition undoubtedly has escaped diagnosis in a few cases, the finding of so few cases of sufficient importance to treat, would indicate the rarity of the condition. The oldest patient in the series was 51 and the youngest, 28 years. The average age at the time of operation was 37. None of the hydroceles had been noted during childhood and the earliest age at which any patient noticed symptoms was 20. Eleven patients had noted tumor in the inguinal region, and the tumor of four others was found on physical examination. The average duration of symptoms was 19 months. The longest time that a mass had been noticed was 16 years; the shortest, two weeks. The duration of the mass, as noticed by the patient, had no relation to its size. Thus the patient who had had the tumor for 16 years had an hydrocele the size of a plum (about 5 cm. in diameter) which had not increased perceptibly in size throughout this time. The largest hydrocele had been noted for 30 months and, during this time, had slowly increased in size. Only one of the 17 patients complained of spontaneous pain and tenderness, while one patient found that wearing a truss caused pain.

For the most part the cysts were small, averaging about 2 to 3 cm. in diameter and their location was such that, in the majority of cases, a diagnosis of inguinal hernia was made. In the 11 cases in which the diagnosis of inguinal hernia was made before operation, an impulse on coughing was thought to have been present, and in all but two the mass was thought to be at least partially reducible. In two cases a diagnosis of femoral hernia was made before operation; only two cases were correctly diagnosed preoperatively; in two cases in which the hydrocele was almost entirely within the abdomen, no preoperative diagnosis was made, the patients having been operated upon for some unrelated condition. In both cases in which a correct preoperative diagnosis was made, the hydroceles were large, extended into the vulva and could be transilluminated.

The frequent association of inguinal herniae with hydroceles in the female has been stressed by several authors previously (Coley, Johnson,[9] and others). This fact was of considerable importance in the past, when the standard treatment for the hydrocele was the injection of some irritant, usually tincture of iodine, into the sac after aspiration of the contents. In our series, seven of the 17 patients had an associated inguinal hernia. In one case, the hydrocele may have occurred in the hernial sac, but in the others both hydrocele and hernia were present. This definite association of hernia with hydrocele in more than one-third of this series of cases, seems to be of considerable importance if any but operative methods are chosen for treatment.

Two of the hydroceles in this series were of the hour-glass type with the larger loculus located within the abdomen. In one of these cases a questionable preoperative diagnosis of femoral hernia was made, while in the other inguinal hernia was thought to have been present. In both cases, rather large extraperitoneal cysts were found, without free communication with the

peritoneal cavity. In neither case was the presence of an intra-abdominal portion of the hydrocele diagnosed before operation. In one case, operative intervention was performed for the supposed inguinal hernia and in the other for leiomyomata of the uterus.

Eight hydrocele sacs of the canal of Nuck were available for microscopic study. Sections from various parts of the walls were made on the freezing microtome and stained with hematoxylin and eosin. In all cases, the hydroceles were lined with a single layer of flattened cells, indistinguishable from the lining cells of the peritoneum. The remainder of the wall was composed of fibrous tissue which was most dense immediately beneath the free surface. The walls varied considerably in thickness and, in the thicker portions, were surprisingly vascular. In two of the smaller cysts with thick walls, bundles of smooth muscle cells independent of the blood vessels were found. The presence of these cells probably can be explained on the basis of the round ligaments, blending into the walls of the hydrocele in this region. In none of the eight cases studied, could the tissue in the lining be interpreted to be cuboidal or columnar epithelium.

Because of the few cases recently reported, a summary of our 17 cases is included (Table I).

TABLE I

SUMMARY OF DATA ON 17 CASES OF HYDROCELE OF THE CANAL OF NUCK

Case	Age	Duration	Size	Side	Hernia	Remarks
1	44 yrs.	2/3 yr.	3x7 cm.	R.	None	Impulse on coughing, reducible mass
2	41 yrs.	5/6 yr.	Lemon-size; inguinal region. Large cyst in iliac fossa	R.	None	Impulse on coughing, reducible mass; hour-glass type of hydrocele
3	46 yrs.	6 wks.	2x3 cm.	L.	None	Extended into labia
4	31 yrs.	*	Large cyst	R.	None	Chiefly intra-abdominal hour-glass type
5	35 yrs.	1/6 yr.	2½ cm.	L.	L. inguinal	Firm; movable in inguinal canal
6	37 yrs.	5 yrs.	Small	R.	R. inguinal	Impulse on coughing, reducible mass
7	51 yrs.	½ yr.	Hickory nut	L.	None	Pain extending down left leg, worse with menses
8	28 yrs.	*	?	L.	L. inguinal	Diagnosis made at operation
9	47 yrs.	*	?	R.	None	Diagnosis made at operation; hydrocele drained from inside of abdomen
10	36 yrs.	16 yrs.	Plum-size	L.	L. inguinal	Truss caused pain
11	30 yrs.	*	?	R.	R. inguinal	Hydrocele of hernial sac
12	40 yrs.	2 wks.	5x3x3 cm.	L.	L. inguinal	Reducible mass; impulse on coughing
13	37 yrs.	*	Small	L.	None	Impulse on coughing; sudden onset of pain; tenderness; mass became irreducible
14	39 yrs.	6 wks.	Egg-size	L.	None	Reducible mass; impulse on coughing; multilocular hydrocele
15	37 yrs.	*	?	R.	None	
16	45 yrs.	7 yrs.	Contained 6 cc. of fluid	L.	Bilateral; inguinal	Left hernia irreducible
17	42 yrs.	2½ yrs.	12x9x3 cm.	L.	None	Extended into labia; many incomplete septa in hydrocele

* Hydrocele found on physical examination or at operation.

SUMMARY AND CONCLUSIONS

The question of the incidence of hydrocele of the canal of Nuck cannot be answered. The small number of reported cases together with the rarity of the diagnosis at the Mayo Clinic is at variance with some previous reports. The diagnosis presents much difficulty, particularly when the hydrocele is confined to the inguinal canal and is too small or is so placed that adequate palpation and transillumination cannot be employed. The finding of an impulse on coughing and the apparent reducibility of the mass cannot be relied on to distinguish hernia from hydrocele in the female. Hernia was associated with hydrocele in seven of the 17 cases in our series. The most important differential diagnostic procedure to distinguish hernia from hydrocele is transillumination. The wall of the hydrocele is made up chiefly of fibrous tissue with a single layer of flattened cells on the inner surface. Smooth muscle may be present in the wall but its finding is not constant.

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