Pathology.—In the gross, the excised kidney was seen to be almost entirely replaced by scar tissue, showing no resemblance to the normal kidney architecture. At the ureteropelvic junction, the point at which the duodenum had been adherent, the scar tissue through which the fistula passed had been excised at operation and left adherent to the duodenum. There was therefore at this point an opening (about 2 cm. in diameter) into the pelvis, at the ureteropelvic junction. Microscopic sections showed, as was apparent in the gross, that there had been a prolonged chronic inflammatory process throughout the entire kidney, with a replacement of almost all the tubules and glomeruli by fibrous tissue.

Convalescence.—The patient made a good recovery. For three days there was only a serous ooze from the wound, but on the fourth day there appeared a profuse watery discharge with an odor similar to that of the content of the upper intestinal tract, and causing an excoriation of the skin for several centimeters on each side of the incision. This discharge of duodenal content gradually lessened and had ceased by the twelfth day, after which there was no further digestion of the skin, and the wound slowly granulated and finally healed after seven weeks.

The most striking feature of the convalescence was the immediate cessation of bladder symptoms. On the day following the operation the patient began voiding without pain and at normal intervals, for the first time in two and one-half years, a remarkable contrast to the extreme bladder irritability before operation. He left the hospital at the end of the seventh week, in excellent condition and free from symptoms.

CASES IN LITERATURE

A careful study of the literature fails to reveal any other case of duodeno-ureteral fistula. In addition to the cases of duodenal fistula following nephrectomy reported by Mayo,¹ there is a somewhat similar case of Thévenard² in which a duodenal fistula developed ten years after nephrectomy in a persistent sinus, probably tuberculous, which had existed since nephrectomy, with intermittent abscess formation.

Van Vranken³ has reported a case, in a man, aged 45, with a large abscess of obscure etiology, pointing over the left Poupert's ligament, which he drained, finding that the abscess cavity communicated with the descending colon. After a month of fecal drainage from the abscess cavity, urinary drainage also appeared and persisted for several weeks, the fistula finally healing completely, although the case was followed for only six months. This case, in which colon and ureter discharge into a common abscess cavity, is the only one to be found in the literature which is in any way analogous to the case reported above.

COMMENT

In view of the history of intermittent attacks of chills and fever, accompanied by pain in the right flank; of the evidence found at operation of an old inflammatory process involving the perirenal tissues; and of the fact that the duodenum, excepting at one point, was normal in appearance and consistency, the most plausible explanation of the origin of the duodeno-ureteral fistula is that the latter was preceded by a perinephritic abscess, which went on to spontaneous cure by rupture into both duodenum and ureter. The condition cannot be explained by an embryologic defect on account of the diverse origins of duodenum and ureter, the former arising from entoderm, and the latter being an evagination from the wolffian duct, which is derived from mesoderm. It was fortunate

that during the operation a good exposure was obtained, because the knuckle of soft-walled duodenum, when pulled up alongside the dense scar tissue at the hilum, could not be palpated, and was discovered only by inspection. It might readily have been clamped and severed with the pedicle, particularly if the necessity for hastily controlling hemorrhage through an inadequate incision had arisen.

The most interesting feature was the immediate cessation of bladder symptoms on the day after operation, the over-night return to normal of a bladder which for two and a half years had been a constant source of distress. The only reasonable explanation is that the irritability was due to the constant presence of small amounts of duodenal content, and presumably trypsin, in the bladder.

CONCLUSIONS

1. This case of duodeno-ureteral fistula is apparently unique.
2. In cases in which there is marked inflammatory reaction around the renal pedicle, the only safe procedure is to locate the duodenum before applying clamps.

Clinical Notes, Suggestions, and New Instruments

A SIMPLE, YET EFFICIENT, SALVARSAN APPARATUS

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In view of the different types of salvarsan outfits in use, it is with some hesitancy that I describe this one. Yet, as I have used it with satisfaction in my office during the past two years, I believe it merits description. It is easily operated without assistance.

Salvarsan apparatus, consisting of Faught blood pressure pump, ordinary aspirating flask and glass connections, and rubber tubing.

then added, and the rubber cork connecting the pump is strapped in the mouth of the flask with adhesive strips. This prevents the cork from blowing out when pressure is increased within the flask. The solution is kept from flowing out of the tubing by the clamping of the latter with an artery forceps. The salvarsan is then given intravenously in the usual way. Pressure can be added and the solution can be given either slowly or rapidly, according to the wish of the operator. The escape valve on the pump allows the pressure to be diminished when this is desired.

2. Thévenard, M.: *Fistule duodéno-cutanée au niveau d'une cicatrice de néphrectomie lombaire, vieille de dix ans; gastro-entérostomie, exclusion du pylore; guérison*, Paris chir., 1913, 5, 870.

3. Van Vranken, A. F.: *Uretero-Intestinal Fistula, as a Result of Abdominal Abscess, Not Due to Appendicitis, with Recovery*, Tr. New York Med. Assn., 1894, 11, 553-556.