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RESEARCH ARTICLE

INCOMPLETE DUPLICATION OF THE URETER CASE REPORT

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ABSTRACT

The incomplete duplication of the ureter, also known as bifid ureter, is one of the most common anatomic variations of the urinary system, and it affects 1% to 2% of the world population. The present study aims to report a case of incomplete duplication of the ureter. During a practice of dissection at the Laboratório de Morfofuncional da Faculdade de Medicina Faceres (FACERES Medical School Morfofunctional Laboratory), the presence of an incomplete duplication of the ureter has been observed. Two distinct ureteric ducts were found in the renal hilum of the left kidney. They merged in the distal third of the abdominal portion of the ureter. This piece of information is important because it complements the scientific knowledge of health professionals and provides support for clinical diagnosis and surgical treatment.

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INTRODUCTION

The urinary tract is one of the most affected systems by congenital malformations in the human body (Gilbert-Barness, 1997). Approximately 10% of the world population have potentially significant malformations of the urinary system (Kumar *et al*., 2005). Anatomical variations in this system can range from anomalies of little clinical importance to severe and potentially lethal alterations, such as renal agenesis (Noronha *et al*., 2003). Among the most common anatomical variations of the urinary system, the pyeloureteral duplicity can be highlighted (Das *et al*., 2001; Anderson, 2012; Ballesteros *et al*., 2016). This malformation is a duplication of the ureter usually linked to complex embryological mechanisms (Fernbach *et al*., 1997; Das *et al*., 2001). The pyeloureteral duplicity can be complete or incomplete, and the unilateral form is more common than the bilateral one (Fernbach *et al*., 1997). In the complete duplication, there are two collecting systems for one single kidney and two parallel ureters that penetrate the urinary vesicle separately (Maranhão *et al*., 2013).

On the other hand, in the cases of incomplete duplication, there are two collecting systems and two ureters that normally merge in the distal third of the duct, between the kidney and the urinary vesicle, originating a single ureter (Maranhão *et al*., 2013). The incomplete duplication of ureters, also known as bifid ureter or ureter in "Y", affects 1% to 2% of the world population, being more common in the right kidney and in women (Fernbach *et al*., 1997). This duplication is responsible for causing asymmetry of sizes between the kidneys, especially in their longitudinal axis, besides a greater volume of renal parenchyma (Fernbach *et al*., 1997). Also, pathological complications, including frequent infections of the urinary system (Giannokopoulos *et al*., 1994), retero-ureteral reflux (Maranhão *et al*., 2013) and ureteric stenosis (Busslinger, 1992) are related to the incomplete duplication of ureters and other anatomical variations that affect the urinary system. In view of the above, this present study aims to report a case of incomplete duplication of the ureter. **Case report:** During a routine dissection of the retroperitoneal area of a male corpse belonging to the collection of the Laboratório de

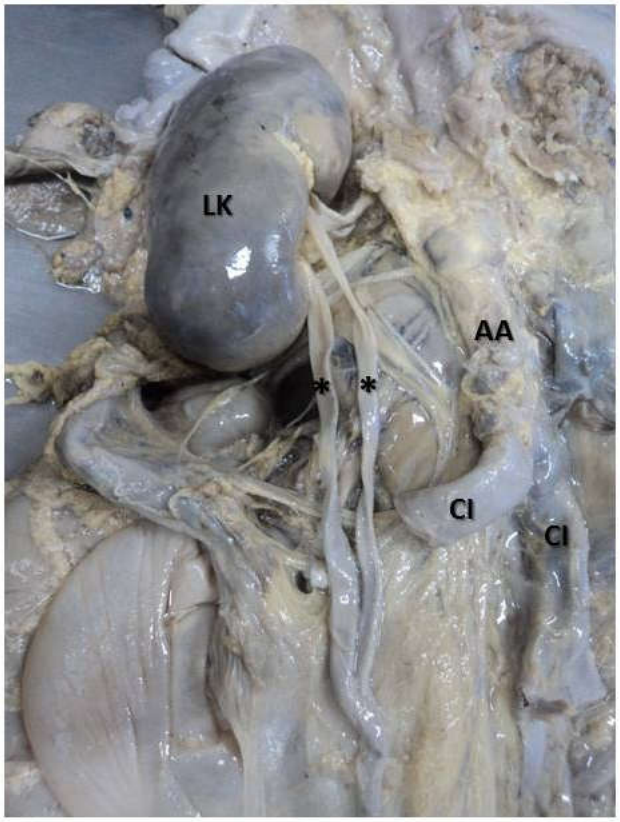

Fig. 1.Rear view of the left kidney demonstrating the presence of an incomplete duplication of the ureter in a male corpse.LK (left kidney); Asterisk (duplication of the ureter), AA (abdominal aorta); CI (common iliac)

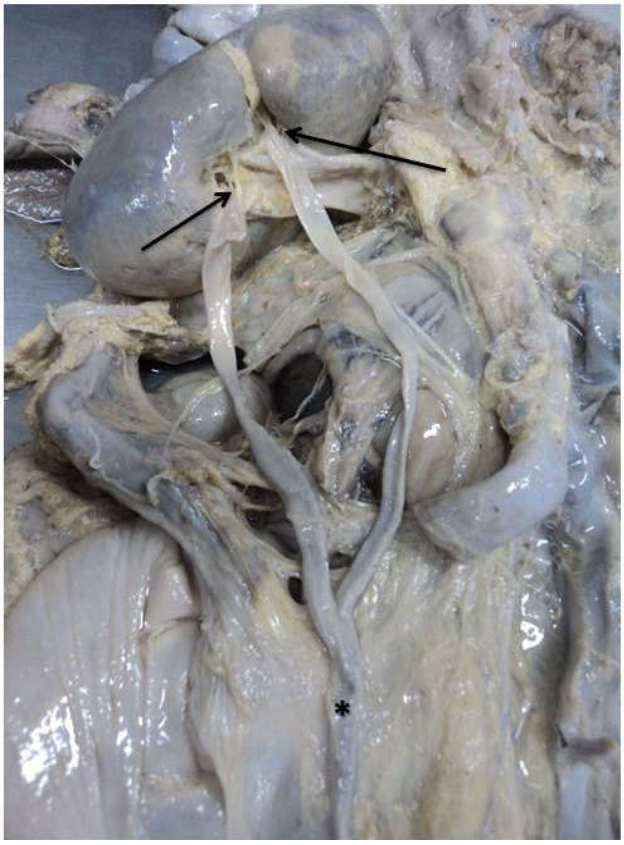

Fig. 2.Rear view of the left kidney demonstrating the renal pelvis emerging separately from the renal hilum and the merging of the ureteric ducts.Arrows (renal pelvis); Asterisk (merging of the ureters).

Morfofuncional da Faculdade de Medicina Faceres (FACERES Medical School Morfofunctional Laboratory), it was observed the presence of an incomplete duplication of the ureter. In order to better understand and visualize the anatomic structure, all superficial fascia that covered the urinary tract was removed, as well as perirenal adipose tissue. The dissections of the ureters were carried out following classic anatomical planes, preserving their sintopy with the other structures. After this procedure, an incomplete duplication of the ureter was observed in the left kidney (Fig. 1). The ureteric ducts presented their renal pelvis emerging separately from the renal hilum and both pathways merged in the distal third of the abdominal portion of the ureter, i.e., above the bladder dome (Fig. 2). The bifid ureter presented a straight pathway towards the bladder dome, going in parallel to the surface of the psoas major muscle and crossing the internal and external iliac arteries. The bifid ureter presented no morphometric variations alongside its pathway. However, the left kidney presented morphometric differences (length: 11.5 centimeters; width: 6.6 centimeters) comparing to the right kidney (length: 9.1 centimeters; width: 6.2 millimeters). The other anatomical structures of the abdominal and pelvic cavity did not reveal any abnormality.

DISCUSSION

In this study, it was reported an incomplete duplication of the ureter in the left kidney of a male corpse. From an embryological point of view, the incomplete duplication of the ureter is due to malformations during the embryonic development (Das *et al*., 2001; Fernbach *et al*., 1997). This anatomical variation occurs when a ureteric bud, originating from the mesonephric duct, is divided before entering the metanephric mesenchyme. Thus, the superior and inferior poles are drained by different renal pelvic systems, but the associated ureters merge before the ureterovesical junction (Kelly, 2014). The incomplete duplication of the ureter is one of the most common anatomical variations in the upper urinary system (Noronha *et al*., 2003). Its incidence is three times higher than the complete duplication (Fernbach *et al*., 1997). In a study of the congenital alterations of the urinary system conducted by Noronha *et al*, (2003), 150 cases (in a series of 6.245 necropsies) of upper urinary tract malformations were found. Among these cases of malformation, the most common were those involving ureteral duplication. These results are similar to the ones reported by Russel *et al*. (2000), who observed that, on average, 3% of the excretory urograms show ureteral duplications in routine examinations. The incomplete duplication of the ureter has been documented in the literature associated with several congenital anomalies, such as Goltz's syndrome (Gunduz *et al*., 1997) and pelvic duplication (Attia *et al*., 1999). Besides, this anatomical variation is related to several pathological complications, including progressive infections of the urinary system (Giannokopoulos *et al*., 1994), ureteral incontinence (Dorko *et al*., 2016) and ureteric stenosis (Busslinger, 1992). In most of these cases, a correct diagnosis of the morphological alterations of the urinary system and an adequate evaluation of the probable complications are necessary (Maranhão *et al*., 2013). Thus, it is possible to say that the findings and the disclosure of the anatomical variations present in the urinary system acquire great importance for clinical diagnosis and surgical treatment. The information reported in our study aims to complement the scientific knowledge of health professionals and provide support for the interpretation of different scenarios.

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