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RESEARCH ARTICLE

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## INCIDENCE OF ACCESSORY POLAR RENAL ARTERY: A BRIEF SYSTEMATIC REVIEW

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### ABSTRACT

The kidneys are essential organs for controlling the concentrations of various substances in the body fluids. They excrete the final products of metabolic activities and excess water, promoting an electrolyte balance. They also have endocrine functions. Renal vascularization occurs through branches from the abdominal aorta artery, the renal arteries being the main and accessory, and these may have anatomical variations. The present work aims to perform a literature review on the incidence of accessory polar arteries, through data collected in articles and anatomy books. This work deals with a review of the literature, using as reference for research the Scielo databases and anatomy books. Where were found a total of 6 articles in Scielo. It was found that about 30% of the population may present anatomical variation regarding renal vascularization. It is concluded that in the surgical procedures, it is of great importance the knowledge of the anatomical variations through imaging examinations, being able to interfere in the planning of the technique to be applied.

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## INTRODUCTION

The kidney is a retroperitoneal organ with the function of draining excess water from the body, removing blood waste and reabsorbing nutrients and chemicals needed for body homeostasis [1]. This organ is described in three poles: apical region (upper pole), mid-region (middle pole) and lower region (lower pole) [1]. At the middle pole is the renal hilum, which presents the renal sinus, the passageway for nerves and blood vessels. It is in these vessels that part of the anatomical variations occurs, that is, approximately 30% of the population may have variations related to renal vascularization, such as the polar renal arteries [2,3]. These variations occur in the embryonic period, due to non-degeneration of vessels located in the lower part of the kidneys, which are responsible for part of the renal irrigation. The non-degeneration of these structures makes them remain called polar or accessory renal arteries.

Vessels commonly arise from the poles present in the kidney structure and may be referred to as polar vessels [4]. In relation to the superior polar artery, it is described as one of the three branches originating from the renal artery. The inferior polar renal artery is described as an accessory branch and may be born from the renal artery or directly from the aorta. During its course, it passes through the inferior pole of the kidney and the anterior face of the ureter, which may cause a condition called hydronephrosis [5].

One of the diagnostic methods for this anatomical variation is computed tomography angiography. Being a quick and perfect visualization exam, it is preferable to the method of magnetic resonance angiography since it allows the visualization of vessels with smaller caliber, such as the accessory polar arteries [6]. Therefore, the aim of the present study was to conduct a literature review study on the incidence of accessory polar renal arteries.

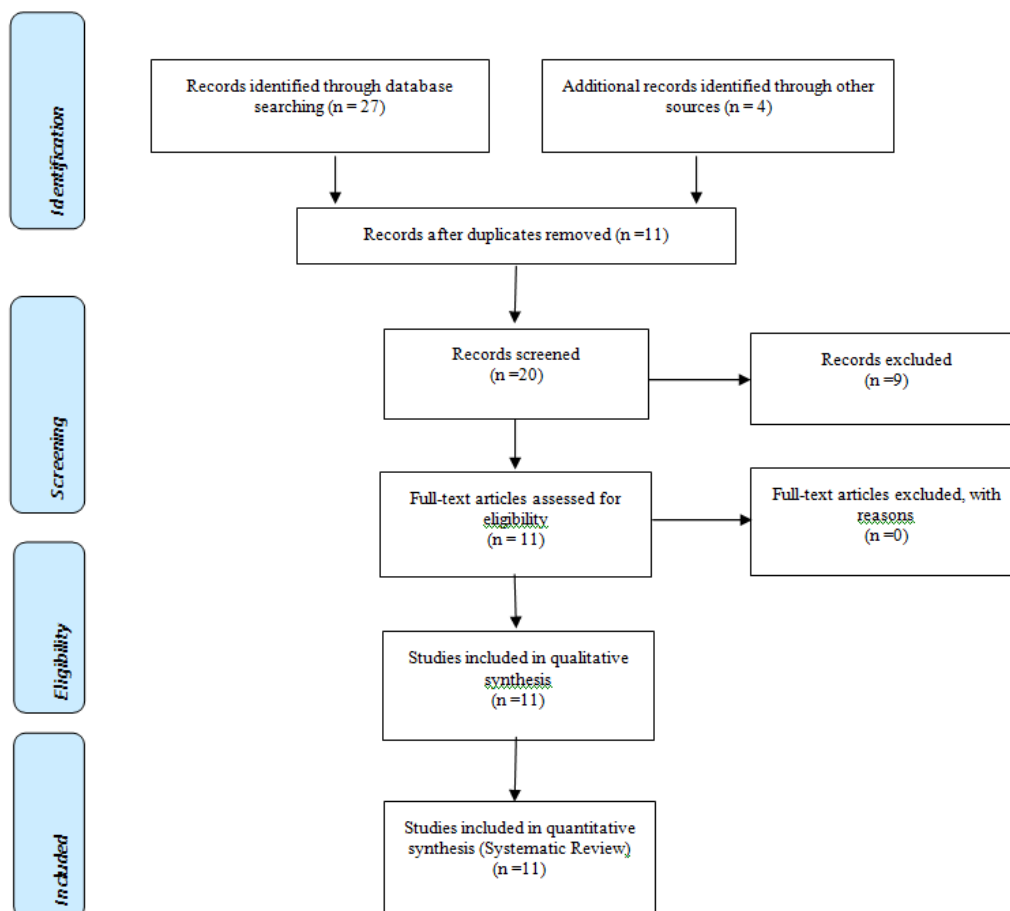
## METHODS

**Study Design:** Following literary search criteria with the use of the MeSH Terms that were cited in the item on "Search strategies", a total of 31 clinical studies that were submitted to the eligibility analysis were checked, and after that, 11 studies were selected, following the rules of systematic review-PRISMA (Transparent reporting of systematic reviews and meta-analyses-<http://www.prisma-statement.org/>).

**Search Strategy and Information Sources:** The search strategy was performed in PubMed, Embase, Ovid and Cochrane Library, Web of Science, ScienceDirect Journals (Elsevier), Scopus (Elsevier), OneFile (Gale) followed the following steps: - search for MeSH Terms: *Kidney. Renalartery. Anatomical variation*, and use of boolean "and" between mesh terms and "or" among historical findings.

**Risk of Bias:** According to the Cochrane model for risk of bias in the present study, the overall assessment resulted in 5 studies with high bias risk and 3 studies with uncertain risk. In addition, there was an absence of funding source in 2 studies and four studies did not disclose the information on the declaration of conflict of interest.

### Flow Chart



## RESULTS AND DISCUSSION

Anatomical variations are observed by computed tomography angiography, according to a study by Çinar Türkvatın (2009) [11], the accessory polar renal arteries are found in 31.3% of cases indicating that the anatomical variation in question is

very frequent and should be the existence of this was observed before surgical procedures. It is a branch of the abdominal aorta artery. Computed tomography angiography is preferable to the method of magnetic resonance angiography as it allows the visualization of vessels with smaller caliber [7]. For transplants, the left kidney is more often used because of its longer venous pedicle [10]. According to Palmieri (2011) [8], the arterial anatomical variations found in the kidneys must be differentiated from vascular anomalies or malformations, and these two hypotheses are discarded, the existence of variation does not influence renal vascularization. They usually irrigate without anastomosis the upper, the medial or lower portion of the kidneys at their poles, and the risk of ischemia if obstruction occurs should be carefully evaluated to avoid renal infarction. Also according to Palmieri (2011) [8], the variation can be found in 33% of men and 20% of women; on ethnicity, it is present in 37% of Africans, 35% of Caucasians and 17% of Indians. These variations, mostly go unnoticed during life, are discovered when there is surgical risk assessment or during the surgical procedure. Sometimes they will only be found during the necropsy procedure. Variations should be studied in a medical context, never isolated [11]. In surgical procedures, it is very important to know the anatomical variations through imaging exams, which may interfere in the planning of the technique to be applied [6].

## CONCLUSION

**Conclusion:** It is concluded that there is a high incidence of embryonic changes in the renal artery anatomy, which in this case are the so-called accessory polar arteries. These are so-called because there was no degeneration of the vessels in the embryonic period, and, moreover, their incidence is high

because it shows that 30% of the population may have anatomical variations related to renal vascularization. Therefore, it becomes a high number when we observe that anomalies are associated with a higher risk of injury during surgeries, and the study and diagnosis of variations are important.

**Declaration of Conflicts of interest:** The authors declare nothing.

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