

## Percutaneous Nephrolithotomy: A Rare Vascular Complication

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### Abstract

### Case Report

We report the case of a 64-year-old patient who presented with a pseudoaneurysm of the inferior polar artery of the left kidney complicated by an arteriovenous fistula secondary to percutaneous nephrolithotomy (PCNL). The treatment by embolization of the damaged vascular branches had been carried out successfully. Through this observation, we will insist on the precise knowledge of the caliceal and vascular anatomy which is essential for the proper performance of PCNL.

**Keywords:** arteriovenous fistula, pseudoaneurysm, kidney, embolization.

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## INTRODUCTION

NLPC is a safe and reliable technique in the treatment of kidney stones [1]. Recently, the efficacy and reliability of this procedure is being improved due to advances in technology and increased experience in this field. However, it is not free of certain complications. Hemorrhage represented by pseudoaneurysm and arteriovenous fistula is one of the most dangerous complications that can be seen after NLPC. Selective and hyperselective embolization has revolutionized the management of post-NLPC vascular complications refractory to conservative treatment [2, 3].

## OBSERVATION

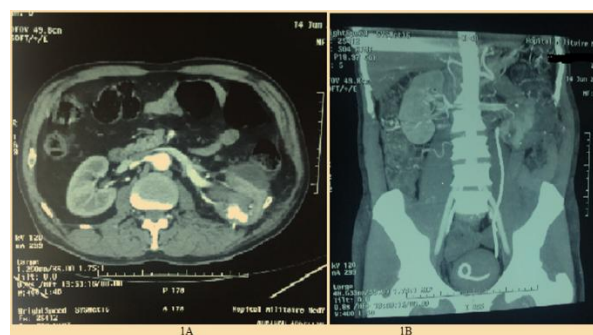
Our patient is a 64-year-old male, hypertensive on treatment, previously operated for a left renal stone in 2010 by lumbotomy.

Admitted to our training for the management of a recurrence of the left pyelic stone. Biologically, renal function was normal with a negative urine cytobacteriological examination.

Our patient underwent a left percutaneous nephro-lithotomy. Subsequently, persistent hematuria developed, resulting in recurrent bladder clotting.

Clinically, our patient had hemodynamic instability; BP= 09.07, HR= 110bpm, with mucocutaneous pallor. As well as a deglobulation that required iterative transfusions.

The patient underwent an emergency angioscan (Figure 1 A, B), which showed a perirenal hematoma with a false aneurysm of the inferior polar artery complicated by an arteriovenous fistula.



**Fig-1A, 1B: Axial A and frontal B scans after injection of contrast medium showing a false aneurysm of the inferior polar artery complicated by an arteriovenous fistula with a left perirenal hematoma, moreover, we note the presence of a few residual calculi the largest at 30mm A, with a good positioning of the double J probe on the left B.**

An embolization was done in emergency by placing coils. The evolution was marked by the cessation of hematuria in the immediate following and a control by a renal scintigraphy with DMSA (dimercaptosuccinic acid) which showed a functional value at 26% at the level of the left kidney compared to 74% at the level of the right kidney and a uroscanner two months post NLPC confirmed the disappearance of vascular lesions figure 2.



**Fig-2: Axial CT slice with contrast injection in late time showing the favorable evolution after embolization two months post-NLPC with spontaneous resorption of the perirenal hematoma and drying of the vascular lesions.**

## DISCUSSION

The first percutaneous nephrolithotomy (NLPC) was described in 1955 by Goodwin and was developed by Fernström and Johansson in 1977.

In the early 1980s, NLPC was the gold standard treatment technique for proximal renal and ureteral calculi [4] alongside ureterorenoscopy (URS); both were less aggressive than open surgery until the spread of extracorporeal lithotripsy (ECL) in 1982 [5].

Complications of NLPC were often described in the 1980s when this technique was innovative before the diffusion of ECL. [4, 6] They were evaluated at 26% on average, including minor complications (non-febrile urinary tract infection, displacement, blockage on removal or obstruction of the nephrostomy tube) and major complications which may be haemorrhagic, urinary, related to lesions of neighbouring organs, infectious or metabolic [7]. They remain dependent on a learning curve and decrease from 15 to 1.5% after about twenty procedures [8, 9].

Seitz *et al.* [10] studied the prevalence of NLPC complications through the different articles from 2001 to 2011, according to the Clavien classification, 88% of patients in Clavien 1, 7% in Clavien 2, 4.1% in Clavien 3 and Clavien 4 to 0.6%.

Vascular complications are represented by arteriovenous fistula, arterioal fistula, aneurysm, pseudoaneurysm or perinephric hematoma [11].

The risk of bleeding after NLPC has been estimated to be 0.8% to 17% depending on how bleeding events are defined the overall transfusion rate was estimated at 7.9% in a prospective series of 301 cases [12].

The mean time to onset of hematuria after NLPC was 5.8 days (3-11 days), and the mean hospitalization during the second admission was 5.4 days (4-16 days) [13]. A prospective study in multivariate analysis identified the predictive factors of post-NLPC hemorrhagic risk as diabetes, previous NLPC, puncture location either by ultrasound or image intensifier, the method of dilatation by balloon or Amplatz or Alken, the number and diameter of the trajectory, intraoperative complications such as stem tear, pyloric wound or sheath exit and operative time.

Age, hypertension, presence of urinary tract infection, renal failure, degree of cavity dilatation, and stone surface area did not significantly influence bleeding risk [14]. Therapeutically, two treatment modalities are proposed. Interventional radiology allows selective embolization of the fistula [15-19]. BOOKSTEIN and GOLDSTEIN, in 1973, were the first to develop this procedure for the treatment of AVF after renal biopsy. Since then, several embolizing substances have been used: gelatin, subcutaneous tissue and muscle, formalized polyvinyl alcohol, cyanoacrylate, lead or steel coils, and balloons used in neuroradiology.

Currently, with the help of new spider-shaped vascular occlusion devices, this method can even be proposed in the treatment of large fistulas, with a low risk of pulmonary embolism [17, 20, 21, 22]. Complications of embolization are rare: one case of post-embolization arterio-caliceal fistula has been described [19]. The risk of tubular necrosis is exceptional [23].

According to Sitki Un and colleagues showed that in a series of 1405 patients who underwent NLPC, 147 had postoperative hematuria requiring transfusion, 133 were treated conservatively, while 14 patients became hemodynamically unstable and underwent angiography with embolization. The success rate of this technique was about 100% [24]. Surgical treatment allows either an excisional procedure, performing total or partial nephrectomy or ligation of the arterial branches supplying the fistula [15, 23, 25], or an extracorporeal or in situ reconstruction procedure [15,17] using vascular microsurgery techniques [26], allowing preservation of renal function.

## CONCLUSION

Arteriovenous fistula is a serious complication that must be evoked in post cutaneous nephrolithotomy if deglobulation and hemodynamic disorder the radio-interventional is the least invasive solution to manage this situation. The miniaturization of endoscopic equipment and the laser will reduce the frequency of this complication.

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