COMPLICATION IN PERCUTANEOUS NEPHROLITHOTOMY: A SINGLE CENTER EXPERIENCE.

Objective: This work focuses complications and management in percutaneous nephrolithotomy. The treatment of the kidney stones has been a significant change in the last 30 years: it has gone from open surgical lithotomy to less invasive treatments, as percutaneous nephrolithotomy (PCNL), ureterorenoscopic stone removal (URS), extracorporeal shock wave lithotripsy (ESWL), that have significant success rates in terms of accuracy of the removal of the stones with a significant reduction of the morbidity and with decrease of healthcare cost. The percutaneous nephrolithotripsy (PCNL) fits into this scenario of change 'as the emblem of the mini-invasive treatments. The role of PCNL was adjusted in the recent years following the results and limitations of ESWL. The use of flexible and miniaturized to explore the urinary tract and the use of the new devices for lithotripsy have increased the efficacy of percutaneous stone disintegration, allow to obtain a stone-free rate of >90%. PCNL have lead a important role for the treatment of pelvic and complex renal stones and it is widely considered in several endourological institutions as the first treatment. PCNL has demonstrated safety and efficacy in the management of large, multiple, or complex renal stones. It is associated with a low but specific complication rate. We report the complications of our experience with 410 patients and we revised the literature focusing the incidence of complications of the PNL and the management.

Materials and methods: 410 patients (202 men and 208 women; average age 49.9 yr) underwent PCNL at a single institution from April 2001 to March 2011. We reviewed the literature focusing on incidence of complications of the procedure. The procedure made were 430 (410 PNL and 20 second Look that usually we performed with flexible nephroscope without anestesia). All patients underwent the diagnostic work-up to definition of stone size (KUB, ultrasound, CT scan) and of anatomy of the collecting system (intravenous pyelogram), to analyze the urine analysis and culture, serum creatinine and clotting parameters. PNL was performed with the patient in prone (90%) and supine position. The picture was made under combined ultrasound and X-ray control. Multi-tract PCNL approach was required in 3 patients with large staghorn calculi or with stones located in parallel with or adjacent to the calix of
the initial puncture, that was difficult to remove with a rigid or flexible instrument via primary access. The mini-perc access was created to establish the right access in cases with the large stone burden, complex collecting system or calyceal diverticula. The access site used most often was the dorsal calyx of the lower pole. Afterwards, a 0.097 mm floppy-tipped guidewire was passed through the needle into the collecting system. The working channel was dilated using Amplatz polyurethane progressive fascial dilators and an Alken telescoped metal dilator under X-ray control to 13-28 F(90%) or a Baloon system, followed by placement of 13-28 F working sheath. Then we used 22-26 nephroscope or 13 F for miniperc.

Under direct vision, the stone was fragmented by ultrasound lithotripsy probe and ballistic devices or Ho:YAG laser in the minimally invasive percutaneous nephrolithotomy (mini-PCNL). Fragments were retrieved by suction or manual extraction using baskets and graspers. At the end of the procedure, the urinary tract is stented with a 7F double-pigtail ureteral stent and a 18-20 Foley catheter was used as a nephrostomy tube. A nephrostogram will help rule out extravasation and the presence of residual fragments. The nephrostomy tube was removed after the second-third postoperative day and ureteral stent shortly thereafter.

We evaluated the incidence and the types of complications, with attention to bleeding, intraoperative hemorrhage, and postoperative hemorrhage, collecting system injuries (perforation and extravasation), injury to adjacent structures (lung, pleura, colon, small intestine, liver, gallbladder, spleen), medical complications (infection, sepsis), air embolism, deep vein thrombosis and pulmonary embolism.

Results: Major complications included septicaemia in 0.2%, renal haemorrhage requiring angiographic intervention in 0.2% and pulmonary embolism in 0.2%. Minor complications in our series included fever (20%), extravasation (6%), clinically insignificant bleeding (7.9%). In the current literature total complication rates after PCNL vary widely, with reported rates of between 29% to 83%. The number of significant bleedings is reported as <8%. The 5-18% blood transfusion rate is reported in the literature. In our series no blood transfusion was required. However, the frequency of major complications is very low (Figure)
Discussion: significant complications in PNL can be attributable to incorrect patient selection, the lack of adequate equipment, technical errors. The percentage of complication in our series is less than the rate complication in literature. The minor number of extravasation could be ascribable to the correct dilatation with metallic dilators. The lower rate of haemorrhage could result from creating a puncture always guided ultrasound and radiological.

Conclusion: to avoid the complications and to ensure optimum outcomes, it is necessary to consider and to programme several factors during planning or performing PNL.

References


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