



INNOVATIVE METAL DILATORS FOR NEPHROSTOMY TRACT

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ABSTRACT **Background:** Dilators nephrostomy have an important component role in percutaneous renal access. Metal telescopic dilators are reusable and economical. They maintain a tamponade effect throughout the dilatation.

Aims and objective: The objective for this article is to compare the new dilator which has been prepared by Dr. A. K. Sanwal.

Materials and Methods: "Sanwal Dilator" was used in approximately 400 consecutive cases of PCNL from January 2012 till January 2017.

Results: "Sanwal dilator" is metallic type of dilator. In comparison of Alken, fascial or scrue dilators, "Sanwal dilator" is very fast for the procedure of dilation, telescopic thus less bleeding, applicable in all types of PCNL, in redo cases, long lasting, can be used for years, low cost and made in India.

Conclusion: "Sanwal Dilator" is a safe and good alternative for other metal telescopic dilators available in the market.

KEYWORDS : Dilator, Percutaneous Nephrolithotomy

Introduction

Percutaneous renal access is an important component of many complex procedures including stone extraction, antegrade endopyelotomy, and resection of transitional cell carcinoma of the upper urinary tract. The choice of nephrostomy tract dilation technique is significant in minimizing the risk complications such as blood loss and perforation of collecting systems.¹

Over the guide-wire, various dilators can be used to establish and enlarge the nephrostomy tract, which then is maintained by a tube.²

Approaches to percutaneous nephrostomy tract dilation have included serially introduced progressive fascial dilators, Amplatz dilator sets, metal coaxial dilators, malleable dilators, high pressure balloons, one step screw dilator, metallic alken dilators etc.¹

Nephrostomy tract dilation is most commonly performed with the telescopic dilators of Alken, the Amplatz polyurethane progressive fascial dilators, or the balloon dilator. Several studies have compared pneumatic dilation with the multi-incremental techniques. They have shown that balloon dilation is safer and faster and reduces the X-ray exposure of the patient and operators. Thus, it is regarded as the gold standard.³

Frattini et al. conducted a randomized study using different dilating techniques, including the "one-shot" technique which was described by them firstly. This method is a single dilation with a 25 F or 30 F Amplatz dilator performed over an Alken guide or an 8 F dilator. This technique required the least amount of fluoroscopy time but the difference was not statistically significant. None of their patients required blood transfusion. As dilation was unsuccessful only in patients undergoing this technique and there were no upper pole or multiple punctures performed, the technique warrants more studies to confirm its superiority. In addition, a commercially available kit of the "one-shot" technique is warranted, as it does not exist at the moment.³

Tract dilation is usually done using Amplatz polyurethane fascial dilators. The metal telescoping dilators of Alken and balloon dilation may be used according to the preference of the physician. Balloon dilation is regarded as the most modern and safest system, but it has the disadvantage of relatively high cost. Frattini et al. demonstrated their unique technique called "one-shot" which consists of a single dilation of the tract with a 25F or 30F Amplatz dilator in a randomised study, they reported that this technique was less expensive and less time consuming.⁴

Metal telescopic dilators are reusable and thus more economical, and they maintain a tamponed effect throughout the dilatation. Previous reports suggest no difference between metallic and sequential fascial dilation in terms of safety and efficiency. Fascial dilators are

disposable and it has been suggested that during sequential dilator exchanges, the tamponade effect on the renal parenchymal tract is lost, which can lead to more blood loss during the exchange process. Both metallic and sequential fascial dilators are time-consuming to use, with an increased incidence of kinking of the guide wire during tract development, thus hindering adequate RD.⁵

Several studies have demonstrated that dilation of the tract using balloon dilating catheters as opposed to Alken metal telescopic dilators or the Teflon-coated Amplatz dilators results in less blood loss.⁶

A variety of techniques can be utilized to perform the tract dilation. The most commonly used dilation techniques are the Amplatz dilator set or the 10 cm, 24-30 Fr dilating balloon catheter and sheath set. Balloon dilation catheters of the 9 Fr size can dilate a nephrostomy tract to a diameter of 24-30 Fr under pressure up to 16-20 atm in a one-step procedure. This may prove difficult or impossible if perirenal scar tissue from a previous surgery prevents complete expansion of the balloon over its entire length. Sequential plastic dilators allow stepwise dilation of the tract under fluoroscopic control; however, on withdrawal for insertion of the next larger dilator, compression of the tract is lost intermittently and bleeding occurs into the collecting system, sometimes hindering subsequent endoscopy. Coaxial metal dilators (each dilator slides over the next smaller one) allow stepwise tract dilation even in the presence of severe scarring with continuous nephrostomy tract compression for improved hemostasis.⁷

With any dilation technique, the last step is insertion of a working sheath, which may be either the 24-26 Fr metal working sheath of the nephroscope or a larger plastic sheath. A 28-30 Fr plastic working sheath is preferable to a metal nephroscope sheath in all cases in which extensive, prolonged instrumentation is anticipated (e.g., staghorn stones). Larger plastic sheaths not only provide better irrigation with lower intrapelvic pressures than do continuous-flow nephroscope sheaths but also allow easier extraction of large stone fragments. The stone can be fragmented with intracorporeal lithotriptors (e.g., holmium: YAG laser, the electrohydraulic lithotripter, ultrasonic lithotripter, the pneumatic lithotripter, and a combination ultrasonic-pneumatic device) and removed with various kinds of forceps and baskets.⁷

Ideal nephrostomy dilators should contain following criteria:

- It Should be and need in majority peripheral centres,
- easy to use,
- Reusable,
- Durable,
- Cost effective,
- Fast in dilation,
- It should cause minimal bleeding,
- It should be effective in almost in all clinical conditions

Now, Amongst the metal dilators, alken telescopic dilators(1985) are the most popular dilator. Followings are the main advantages of metal dilators:

- propensity to perforate & risk of haemorrhage,
- large in number(8),
- cumbersome to use

The objective for this article is to compare the new dilator which has been discovered by Dr. A. K. Sanwal.

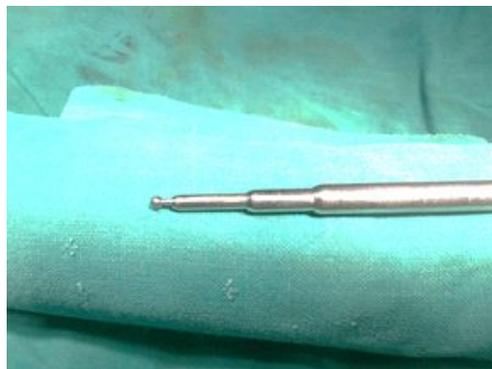
Materials and Methods

Dr. A.K. Sanwal and team, Sanwal Hospital & Research Centre, Kanpur Road, Jhansi, India, has developed a dilator for nephrostomy procedure.

We described new telescopic metal dilators for universal use in percutaneous nephrolithotomy (PCNL).

The dilator developed by us having following characteristics:

- Three hollow metal tubes of 24 mm length of 9-14 F, 14-20 F, and 20-26 F size.
- It allows to Passover 8F hollow guide rod in a telescopic manner one over the other
- Tip of these rods are tapered in such a fashion that they not overshoot tip of guide rod thus avoiding perforation



(1)



(2)



(3)

Figure 1: "Sanwal Dilator"

For the above mentioned dilators developed by Dr. Sanwal and team, experiment was carried out after obtaining consent from patients.

We have been used the Sanwal dilator in approximately 400 consecutive cases of PCNL from January 2012 till January 2017.

- For ultra mini PCNL, upto 14F, first dilators is sufficient,
- For mini PCNL upto 20F, second telescopic dilators is required,
- For standard PCNL, third telescopic dilators is required for dilation upto 26F.

Results and Discussion

The "Sanwal Dilator" has been developed which is metallic type of dilator.

Other metallic dilators already available and commonly in use are Alken Dilator and fascial or scrue dilators.

Advantages of "Sanwal Dilator" over Alken Dilators are as per following:

- Procedure of dilation is very fast,
- Telescopic thus less bleeding,
- Applicable in all types of PCNL (Ultra Mini, Mini & Standard),
- Applicable in redo cases as of made of steel,
- Long lasting and can be used for years together
- Available in very low cost of about Rs. 7000. Thus one of the cheapest among all available telescopic dilators,
- Made in India hence incorporate our national theme, "MAKE IN INDIA".

Advantage of "Sanwal Dilator" over fascial or scrue dilators are as per following:

- Telescoping over each other thus less bleeding,
- Faster dilatation thus saving operative time,
- Can be used in redo cases as made of metal,
- It is present due to telescoping nature,
- Much cheaper,
- Reusability much more,
- Applicable in redo cases,
- Bleeding comparable as tamponed effect,
- Made in India

Therefore, it has been found that "Sanwal Dilator" having following ideal characteristics:

- It is in need of majority peripheral centers,
- Easy to use,
- Reusable,
- Durable,
- Cost effective,
- Fast in dilation,
- Cause minimal bleeding due to telescopic nature and speed of dilation,
- Effective in almost in all clinical conditions.

Conclusion

"Sanwal Dilator" is a safe and good alternative for other metal dilators available in the market. "Sanwal Dilator" meet all ideal characteristics of metal dilator required for nephrostomy tract.

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