



## **RIRS and Laser Lithotripsy for Kidney Stone Treatment: Can We Make it Affordable?**

Kidney stone is a common problem worldwide. The history of urinary stones almost begins and goes parallel with the history of civilization. Treatments for stones were mentioned in ancient Egyptian medical writings from 1500BC.<sup>1</sup> Their global incidence and prevalence are rising.<sup>2</sup> Once someone has a kidney stone, the likelihood of having another episode is about 50% within 5 years. This indicates the need for multiple interventions in some cases. Urologists throughout the world have been trying to develop less and less invasive procedures. The treatment of kidney stones has gone through a rapid evolution process over the last three to four decades. We are also not out of it. The embracement of new technologies and affordability made it possible to change the practice towards minimal invasive procedures. Whilst the open surgery was common practice for all types of kidney stones in 1980s in Bangladesh. ESWL emerged as treatment option after its establishment in the then IPGMP in 1991. Success rate drops of ESWL to 50%, especially for lower calyx stones. Often require repeated treatment or auxiliary procedures in presence unfavorable calyceal anatomy, hard stones and obesity. Its failure provoked the development of PCNL in late 1990s. Most of the centers throughout the country has now been adapted PCNL as a preferred procedure for Kidney stones. Stone free rate following PCNL is between 78% and 96%. It is well known that PCNL sometimes can cause considerable morbidity. There are plenty literatures to support this. The Procedure is more invasive when it is bilateral and multitrack. Possible complications like bleeding are still a matter of concern. Patient with significant comorbidities such as morbid obesity and bleeding diathesis, PCNL may be not the best choice. Interventions for ureteric stones by using semirigid ureteroscopy and pneumatic lithotripsy adopted by our urologist since mid-1990s. In the meantime, the advent of Holmium Laser with its flexible laser fiber urologist learns to treat the kidney stones in different location. The retrograde intrarenal surgery (RIRS) and laser

lithotripsy (LL) became rapidly popular and its potential indications are expanding.<sup>3</sup> Although holmium: YAG laser added as tools for ureteric stone lithotripsy as early as early 2003. But its uses in lithotripsy for kidney stones took another decade in this country. The reasons slow adaptation of RIRS and laser lithotripsy as a treatment option in this country are many. Flexible ureteroscopy itself has gone through an evolution process. Visibility, Breakability and costing of the fiber optic flexible Ureteroscope were the major hindering factors. The advent of Digital Flexible ureteroscope in 2006 lead widespread use of RIRS and LL procedures throughout the world. In Bangladesh we started to do RIRS around 2014. Some government and private institutions established the setup of digital flexible Ureteroscope. But this is also not without problem. The DFU lasts longer than Its fiber optic counterpart. But the initial cost of establishment, repair cost, delay in repair, sterilization process, learning curve, make it difficult to establish and run this impressive service smoothly.<sup>4</sup> Even selective utilization to minimize ureteroscope damage, using miniaturized nitinol devices, maximize use of ureteral access sheath, passing devices through straight scopes, not to fire laser fiber inside of scope could not prevent breaking of digital flexible scopes. This is not a problem in our country but also in the developed world. To overcome these difficulties the idea of Single use digital flexible ureteroscope came up around mid-2010s. This eliminates the initial cost investment, risk of breakdown, sterilization with comparable vision quality with their non-disposable counterpart. This serves as a substitute for the fragile and expansive reusable scopes. Less weight gives Ergonomic benefits to the surgeon. Eliminates concerns about the complexity and completeness scope processing or sterilization. Several studies show the stone clearance rate almost equal to reusable scope. But the cost of disposable or single use digital flexible ureteroscope is increasing with improving quality. Initially it was available when less

than 400 USD. When part of it was semirigid and small part near tip was flexible. But now it is available as fully flexible with improved quality. Cost now varies from 900 USD to 1200USD depending up the companies. On top of that they impose a time limit for each scope to remaining functioning from 4 to 20 hours. Even if the scope is not damaged, they programmed it such way that it will not able to functional after the specified time. To use this single use device on a single patient puts an extra burden on the patients in this region, where most of the patient spend their medical bill from out of pocket. The question is how we can reduce the cost per procedure and take the facilities of flexible scope. We can bargain price with the manufacturer for special price for country like Bangladesh or wait for competition to grow and price to fall. But practical option is to reuse the single use device (SUD). In the developing world, reuse is very common due to paucity of medical supplies and shortage of financial resources. We saw to reuse even facial masks during this covid-19 pandemic throughout the world. We urologist used to reuse lot things in our practice. Other specialties like interventional cardiologist, Gastroenterologist regularly reuse single use products. Even FDA recommend using different single product to reuse after proper sterilization. They recommend to sterilize the product by third party or according to their guide line.<sup>5</sup> Reuse of single-use medical devices has been happening since the late 1970s. Approximately 20–30% of US hospitals confirmed reuse of at least one type of SUD. Surveys across Canadian hospitals report that approximately 25% of health care facilities reprocessed SUDs. The extent of reuse in hospitals is estimated to be 10% in the UK, 30% in Denmark and 100% in Norway.<sup>6</sup>

Main concerns of using SUD is risk of cross contamination, transmission of infections, device failure, legal and ethical issues. According to US Center for Disease Control (CDC), properly cleaned and sterilized SUD does not pose a risk of infection to patients. CDC emphasize the need proper check of the device before using it. The overall safety record for reprocessed SUDs is excellent. It is to be realized that device failure can occur even in a new device. Again, when reuse a SUD, it is the users and hospitals responsibility to maintain international standard of disinfection and sterilization. However, informed

consent can be taken from the patients before using SUDs in our patients to avoid any controversy.<sup>5</sup>

RIRS and LASER lithotripsy has stood the test of time. It is a very lucrative procedure for both patients and surgeon. With the improving technology and increasing use and experience, more procedures are being performed with less morbidity throughout the world. In Bangladesh cost is a factor; however, this can be overcome by selective utilization or reuse of disposable device after proper reprocessing.

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