Commentary

How do we know what damage a safe intervention has in the long-term: Considering the risk of extra-corporeal shockwave lithotripsy and the onset of diabetes mellitus

There is no doubt that extracorporeal shockwave lithotripsy (ESWL) has revolutionized the way in which we treat urolithiasis. In many instances, it is the definitive treatment and saves patients having invasive endoscopic procedures, which themselves are not without their own complications.

It is true that, as clinicians, we are not overwhelmed with such complications after ESWL as to scrutinize its use at all. However, an increasing awareness about actual, potential and long-term complications is crucial, which is not just to help judicious utility of treatments for suitable patients, but also to counsel our patients and professional colleagues about the possible long-term risks.

Our understanding significance of chronic diseases has been provoked by a great awareness of the long-term complications of such conditions. The impact of diabetes mellitus to the individual may be devastating: When considering the risks of cardiovascular morbidity, neuropathy, retinopathy and nephropathy. In addition and of crucial consideration also, the impact that managing these conditions has on health-care services world-wide.

In a study published in The Lancet in 2011, involving 2.7 million participants, it was found that the age-standardized prevalence of diabetes mellitus is 9.8% in men and 9.2% in women. It was also observed that glycaemia and diabetes mellitus rates are rising globally.[1] Factors that affect the incidence are generally thought to be immobility, obesity and lack of exercise.

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Urolithiasis is associated with infection, genetic conditions, and of course may be idiopathic. Increasingly, we are also aware of factors such as immobility, obesity, and chronic intestinal diseases and their relationship to urolithiasis. Endocrinopathy is already established - patients with hyperparathyroidism are at a higher risk of stone formation.

Understanding the physics of lithotripsy helps provide a greater appreciation about how this well established treatment may be responsible for undesirable damage to surrounding tissues.[2] Whilst all lithotripters have a focus of acoustic energy, the ideal device would have a focal point that would be infinitely small, so as to avoid collateral damage. However, due to the means of wave propagation this is not currently possible.

The literature to date has indicated varying results linking ESWL to diabetes mellitus. Many of the studies that have reported are either based on small cohorts, or have relatively short follow-up, or are retrospective in design. Nevertheless, a study involving a large population with 6 years follow-up indicated no association between diabetes mellitus risk and ESWL.[3] Knowing whether this follow-up period is long enough is difficult to establish.

Implicating an intervention for increasing the risk of a secondary disease is quite a difficult thing to prove. Of course, in some situations a causal association is more easily accepted: Such as secondary rectal cancer after prostate radiotherapy. However, when a complication is likely to be late in presentation, perhaps over a decade after the intervention, then it is difficult to automatically implicate it: As it is generally accepted that such conditions are multi-factorial in etiology.

In the current retrospective study with 15 years follow-up, we see a demonstration of the potential endocrine effect of ESWL. The authors suggest that the cause is occult pancreatic insult. This mechanism seems feasible. There is contradictory evidence in the current world literature, but this study is quite large and crucially has long-term follow-up despite the usual limitations of the retrospective design.

Once again, we see cumulative evidence that indicates that there is discordance in findings between studies. At the very least, it should indicate to us that there may be enough diagnostic doubt to produce a collaborative, multi-center prospective study that is powered to specifically test whether contemporary ESWL may be implicated for development of either impaired glucose tolerance or actual diabetes mellitus. It is likely that even if such a prospective study does not demonstrate a direct causal link, it may identify a syndrome of clinical features that unequivocally combines the risk of ESWL and diabetes mellitus. We are increasingly aware of the association between biochemical and endocrinological abnormalities, insulin resistance and obesity. A recently published study involving over 11,000 patients has identified that urolithiasis can be linked to the metabolic syndrome.[4]

Perhaps a future prospective study will help urologists identify and risk stratify patients who will, most likely, benefit from combined urological and endocrinological multi-disciplinary management.

In the meantime, it is unlikely that urologists will be restricting the use of ESWL. However, whether we should be counseling patients about the potential future risk of developing diabetes mellitus is harder to advise at this stage. Nevertheless, a heightened awareness of the possibility that the treatments that we consider to be minimally invasive may carry with them currently unrecognized risks is recommended and appropriate future study is strongly advised.

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