Abstract 32  Fabrication of artificial kidney stones of different physical properties for ex vivo experimentation

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Introduction: There have been several new technologies introduced recently for lithotripsy. The optimal settings of these devices are unknown for different kidney stone densities. This study aims to develop artificial kidney stones for ex vivo studies.

Methods: BegoStone was prepared with a powder to water ratio (by weight) ranging from 15:3 to 15:6. The phantoms’ acoustic properties were characterised by using an ultrasound transmission technique, from which the corresponding mechanical properties can be calculated based on elastic wave theory.

Results: The measured parameters for BegoStone phantoms of different water contents were assessed with regard to longitudinal wave speed, transverse wave speed, density, longitudinal acoustic impedance, transverse acoustic impedance, Young’s modulus, bulk modulus, and shear modulus. Longitudinal (CL (m/s)) and transverse wave speeds (CT (m/s)), and density (ρ (Kg/m3)) of BegoStone phantoms with different powder to water ratios corresponded to the known properties reported in natural kidney stones (Calcium Oxalate Monohydrate, Brushte, Uric acid and Struvite). A BegoStone water ratio of 15:3 had similar properties to Calcium Oxalate Monohydrate, 15:4 to be similar to Brushte, 15:5 was similar to Uric acid, and 15:6 was similar to Struvite.

Conclusion: This BegoStone preparation method can be used to fabricate artificial stones with physical properties matched with those of natural kidney stones of various chemical compositions.

Abstract 33  In vitro evaluation of optimal device settings for the Swiss Lithoclast Trilogy Lithotripter

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Introduction: The LithoClast Trilogy Lithotripter is the latest generation lithotripter. It has four modifiable settings for stone fragmentation - Impact (0–100%), frequency (0–12 Hz), ultrasound (0–100%) and suction (0–100%). The configuration for different stone types is unknown. We aim to determine the optimal settings for four stone types.

Methods: Calcium oxalate, calcium phosphate, uric acid and struvite 2 cm³ phantoms were created using Begostone. Ultrasound and suction were kept constant at 100% and 40%. Impact and frequency were adjusted for a combination of 10 settings and repeated N = 3. Drill speed and fragment size were calculated using 34 mm.

Results: One hundred percent impact and frequency of 12 Hz resulted in the fastest clearance times of Struvite phantom stones, mean 83 seconds. For uric acid stone phantoms, impact of 30% and a frequency of 4 Hz was the fastest setting for stone clearance, mean 83 seconds. Calcium phosphate stone phantoms were treated fastest at an impact of 30% and frequency of 4 Hz (mean 217 seconds). The fastest clearance rate for calcium oxalate stone phantoms was at an impact of 30% and a frequency of 12 Hz (mean 204 seconds). Interestingly the slowest rate of calcium oxalate stone phantom clearance was an impact of 60% and 8 Hz (mean 269 seconds).

Conclusion: Stone clearance rates, drill speeds and average fragment sizes were calculated for the most commonly occurring stones using the Swiss Lithoclast Trilogy lithotripter. The results indicate that harder stone phantoms may fragment more efficiently at lower device settings.

Abstract 34  A cross sectional sample study of pregnancy and renal outcomes after renal transplant at the National Kidney Transplant Service

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Introduction: Renal transplantation for end stage renal disease (ESRD) offers a significant improvement to quality of life and overall survival benefit. Women receive 40.6% of renal transplants at the NKTS. Given that fertility in women with ESRD is reduced by a factor of 10, renal transplantation also offers women of child bearing age an increase of fourfold in their fertility. Despite this, pregnancy rates in transplant recipients are lower than the general population.

Methods: A retrospective cross sectional sample study was performed of 41 women of childbearing age (18–49 years) who were reported to be planning for conception post renal transplantation. The centralised renal Electronic Patients Records (EPR) was used to collect details of successful pregnancies, pregnancy complications and renal function after pregnancy.

Results: Forty-one patients were identified who were planning pregnancy. Eighteen patients who never became pregnant, had been lost to follow up or had no documentation on the EPR were excluded. Thirty-six pregnancies were documented in 23 patients. Nine (25%) pregnancies ended in miscarriage. Eight (29%) full term pregnancies were complicated by pre-eclampsia. None of the women required dialysis during pregnancy. Five patients (21%) required a subsequent transplant after pregnancy. Mean time to repeat transplant after pregnancy was 4.4 years.

Conclusion: This sample provides an insight into pregnancy outcomes of women who received a renal transplant in Ireland. Miscarriages are slightly higher than the general population. Pre-eclampsia rates are higher than the general population. In those that went onto require further transplant, renal failure was not pregnancy related.

References

Abstract 35  The Paediatric Renal Transplant Recipient: A retrospective review of the changing trends of transplantation in Ireland

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Introduction: Renal transplantation in the paediatric population for end stage renal disease (ESRD) offers a significant improvement to quality of life and overall survival benefit. Even with the current Covid-19 pandemic, 123 renal transplants were carried out in Ireland in 2020.

Methods: A retrospective analysis was performed of all paediatric transplant recipients (0–16 years old). The decades (eras) from 1969 to 2020 were then compared.

Results: There were 329 paediatric transplants performed, 35 (10%) were a 2nd transplant and 9 (3%) had a 3rd transplant during childhood.