The introduction and propagation of the peristaltic wave along the different ureteric segments have not been wholly and sequentially described. Is there a specific relationship of the ureteric segments during peristalsis and whether this behavioural difference can be affected by cholinergic modulation and ureteric obstruction by stones? Hypothesis and aims of the study We hypothesise that there are physiological differences in the contractile properties of the pelvicalyceal system (PCS), renal pelvis (RP), upper ureter (UU), middle ureter (MU) and lower ureteric (LU) segments and cholinergic modulation has a different effect on the various segments of the ureter during basal contraction and ureteric obstruction due to stones. Aims and objectives 1. Investigate the basal spontaneous activity of the different segments of the upper urinary tract. 2. Describe the contractile behaviour between the upper, middle and lower ureteric segments in response to cholinergic modulatory agents. 3. Develop an in vitro model of ureteric obstruction. 4. Compare the upper and lower ureteric segments basal contraction with and without intraluminal stones. Investigate the effect of cholinergic agonist - carbachol on stone passage in the upper and lower ureteric segments. Materials and methods There are three experimental settings which test each element of the hypothesis. Investigate the effect of cholinergic agonist - carbachol on stone passage in the upper and lower segments. Results EXP 1: The pelvicalyceal system (n=32), renal pelvis (n=28) and the upper ureter (n=38) segments demonstrated basal spontaneous activity in 67% and 63% respectively. The middle (n=18) and lower ureteric (n=26) segments demonstrated spontaneous activity in 100% and 65% respectively. The PCS (fig. 1(a)) demonstrated the lowest amplitude (0.044±0.0009) of contraction with but significantly (p<0.001) higher frequency (18.1±2.7 Hz) than the UU, MU & LU. The Renal Pelvis demonstrated significantly (p<0.001) higher amplitude (0.018±0.0046) of contraction than the PCS (0.046±0.0009), UU (0.006±0.0012) and MU (0.014±0.0015). The frequency (21.2±0.5 Hz) of contraction in the UU, fig. 1(b) was lower than the PCS, RF and RP but significantly higher than the UU (5.5±0.63). The LU had significantly (p<0.001) higher amplitude (0.026±0.0021) than the PCS, RF, UU and MU but lower frequency (5.5±0.63) than the PCS (38.1±2.7). The RP and the UU segments. EXP 2: All the upper ureteric segments (n=23), demonstrated basal spontaneous activity (BAS) (100%). The middle (n=24) and lower ureteric segments (n=24) demonstrated a lower percentage of spontaneous activity (63%) in both. Carbachol 10µM significantly enhanced the amplitude and the frequency of the spontaneous activity in the MU (P<0.01) (n=13) and LU (P<0.001) (n=17) segments. However, it did not affect the BAS of the UU segments (n=16). Atropine 1µM did not have an effect on the UU, MU and LU segments. EXP 3: There was an increase in amplitude of contraction, fig. 2(a) in the upper ureteric segment plus stone (0.009±0.0026 µm/g/min) in comparison with the UU basal contraction minus stone (0.005±0.0027 µm/g/min). The UU CCh stimulated segments minus stone (0.0049±0.0025 µm/g/min) and the ureteric segment plus stone and Carbachol did also have an increase in amplitude (0.006±0.0022 g/mg/min) in comparison with the UU segments. The frequency of contraction was also increased when the ureteric segment plus Carbachol each had an impact on increasing the contractile frequency of the ureteric segments fig 2(b). The contractile frequency of the UU segment minus stone (4.29±1.21±5/min) has shown the lowest frequency of contraction in comparison with the basa frequency of contraction (1.80±1.25/min) of the upper and lower ureteric segments. The frequency of contraction with and amplitude of contraction to propel urine through the pelviureteric junction. This study demonstrated that there is a difference between the basal and cholinergic modulated contractile behaviour of the pig ureter in organ bath experiments. The upper, middle and lower ureteric segments have demonstrated a difference in their contraction response to both carbachol and atropine. Carbachol had a significant effect on the amplitude and frequency of contractility of the middle and lower ureteric segments. Obstruction affected the ureteric contractility which was different between the upper and lower segments. The effect of cholinergic modulation on obstruction especially in the lower ureter may have an effect on stone passage. Discussion This study has shown that the pelvicalyceal system had a significantly higher frequency of contraction in comparison with the other segments. The frequency and amplitude of contraction in the renal pelvis and the upper ureter demonstrated a significantly higher frequency of contraction in comparison with the middle and lower ureteric segments. There was an inverse relationship between the frequency and amplitude of contraction, as the frequency increases in a segment, the amplitude decreases. This was observed in all segments except the renal pelvis which is the only segment that demonstrated high frequency and amplitude of contraction to propel urine through the pelviureteric junction. This study demonstrated that there is a difference between the basal and cholinergic modulated contractile behaviour of the pig ureter in organ bath experiments. The upper, middle and lower ureteric segments have demonstrated a difference in their contraction response to both carbachol and atropine. Carbachol had a significant effect on the frequency and amplitude of contractility of the middle and lower ureteric segments. The frequency of contraction may provide insight into the development of a targeted approach in the management of ureteric conditions. Further research is required to investigate the effect of cholinergic modulation as a means for medical expulsive therapy. Conclusions The difference in the contractile behaviour of the pelvicalyceal system, renal pelvis, upper, middle and lower ureter may indicate that each segment plays a different role in mediating the peristaltic wave and the effect of cholinergic modulation alters the frequency and amplitude of contractility which is similar to ureteric obstruction. Understanding the difference in the basal contractile behaviour of the upper urinary tract may provide insight into the development of a targeted approach in the management of ureteric conditions. Further research is required to investigate the effect of cholinergic modulation as a means for medical expulsive therapy. References 1- Griffiths, D.J. & Nolph, K.D., 1993. 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