

Effects on Contralateral Kidney in Experimental Animal

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The goal of this experiment was to record the degree of hydronephrosis in ligated kidney as well as the changes in contralateral kidney. For this work experimental animals were operated at old PGMI house at Mayo Hospital and ureters were ligated with silk No.3/0. To record the changes in ligated and control kidney, ultrasound machine was used for seven consecutive days. In this work the mean longitudinal length was measured on day 1 upto day 7. The mean difference on the day 1 and 2 was 0.7cm which was statistically insignificant. The mean difference on day 1 and day 3 was 1.1cm, 4th day 1.8cm, 5th day 2.5cm, 6th day 3.2cm and on 7th day was 4.2cm. All these differences show statistically significant increase in longitudinal length at $P < 0.01$ except on day 3 where the significance was at $P < 0.05$. When day 2 was compared with the rest of seven days the mean difference was significant at $P < 0.05$ and rest of the days the mean difference was significant at $P < 0.01$. On day 3 longitudinal length was significant at $P < 0.01$, on day 5th and 7th. On day 5th the mean difference on 5th and 7th day was found statistically significant at $P < 0.01$. After day 6th the mean difference 1cm was found statistically insignificant. We conclude that the control kidney exhibits significant increase in longitudinal length.

Key words. Contralateral kidney, animal

In experimental unilateral renal obstruction renal mass increases in both kidneys in the first 7 to 10 days, followed by a progressive decline in mass in the obstructed kidney. The growth in the obstructed kidney may be a local response to injury². In ureteric obstruction glomeruli only increase in size while the blood vessels increase in caliber. In compensatory hypertrophy RNA synthesis increases first followed by enhancement of protein and DNA synthesis¹.

Said obstructive uropathy is associated with several changes some of them are mediated by CAMP. It was proved that the changes in CAMP metabolism may contribute to the altered cortical tubular function in unilateral ureteric ligation and may be partially related to enhanced prostaglandin synthesis in the obstructed kidney. In contralateral kidney higher adenylate activity and changes in CAMP reflect increased PGE_2 production by those glomeruli.

Aims and objects

1. To record the changes in size of contralateral kidney.
2. To know the microscopic changes after nephrectomy.

Materials and methods

For this experimental work young healthy dogs were included in this study. Dogs were kept in old PGMI animal house.

Bread, meat milk and free access of water was provided for each experimental animal. For surgical procedure, Inj. Ketamine 2ml/kg body weight was used as anaesthetic agent. After kidney position flank approach was used for kidney and ureter. Ureter was ligated with silk No. 3/0 and wound was closed in layers. During operation Inj. 0.9% NaCl was given through femoral vein. For postoperative pain, Inj. Diclofenac sodium was given 1/M.

Results

The mean difference between day 1 up to day 7 was 1.1cm, 1.8cm, 2.5cm, 3.2cm and 4.2cm.

All these differences show statistically significant increase in longitudinal length at $P < 0.01$ except a day 3 where the significance was at $P < 0.05$.

When day 2 was compared with rest of days on day 3 the mean difference was not significant. On day 4 difference was significant at $P < 0.05$ and rest of days mean difference was significant $P < 0.01$.

On day 3 mean increase in length was not significant on day 4, length was only significant at $P < 0.01$ on day 5th, 6th and 7th.

The mean difference as compared with day 4 was 0.7cm, day 5th was insignificant on day 6th, 7th at $P < 0.01$.

After day 6th the mean difference 1cm was found statistically insignificant

Discussion.

In unilateral obstructive uropathy changes occur not only in obstructive kidney as well as in the contralateral normal kidney. Increased compensatory hypertrophy is noted in the contralateral kidney of the young animal if animal is as younger greater the injury that occurs to the ipsilateral kidney³. The neonatal kidney is more susceptible than the adult kidney to injury from partial unilateral ureteric obstruction.

Studies performed in rat and guinea pig after complete unilateral ureteric obstruction during obstruction the concentration of rennin gene was more on obstructed kidney as compared the contralateral control kidney⁴.

In obstructive uropathy experimental animals there is significant number of eosinophils in the obstructed kidney.

Tubular injury in unilateral ureteric obstruction has been associated with rapid gene activation in both the contralateral and obstructed kidney⁵.

Table 1. Results of ultrasound of control kidney

No. of days TL/LL	Dog 1	Dog 2	Dog 3	Dog 4	Dog 5	Dog 6
Day 1 - LL	11mm	9mm	10mm	5mm	5mm	8.6±2.3
TL	3mm	4mm	4mm	3mm	5mm	3.8±0.83
Day 2 - LL	11mm	10mm	10.5mm	6mm	9mm	9.3±1.98
TL	4mm	5mm	5mm	3mm	5mm	4.3±0.89
Day 3 - LL	11mm	10.5mm	10mm	7mm	10mm	9.3±1.70
TL	4.5mm	5mm	5mm	3.5mm	5.5mm	4.3±0.75
Day 4 - LL	12mm	11mm	11mm	7.5mm	10.5mm	10.4±1.71
TL	5mm	5mm	5.5mm	3mm	5mm	4.7±0.97
Day 5 - LL	12mm	12.5mm	12.5mm	7mm	11.5mm	11.00±3.68
TL	5mm	6mm	6.5mm	3mm	6mm	5.3±1.39
Day 6 - LL	13mm	13mm	12mm	9mm	12mm	11.8±1.64
TL	6mm	6mm	6mm	4mm	5mm	5.4±0.89
Day 7 - LL	14mm	14mm	13mm	10mm	13mm	12.8±1.64
TL	6mm	6mm	7mm	4mm	5mm	5.6±1.00

Table 2. Comparison of the mean ±SD of longitudinal length of kidney in five control dogs

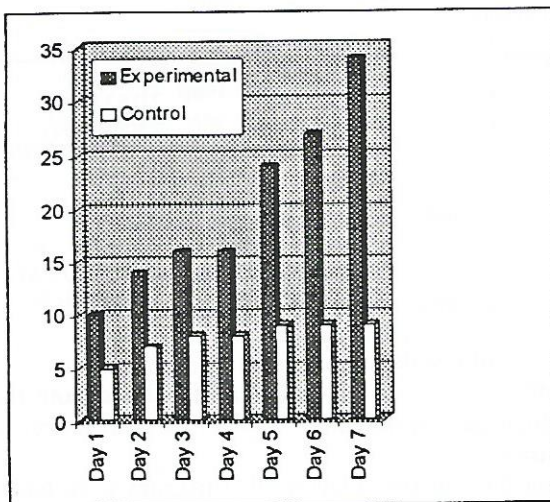
Days	Mean±SD (mm)	Mean (mm)						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Day 1	8.6±2.3	-	±0.7 ^{NS}	±1.1*	±1.8**	±2.5**	±3.2**	±4.2**
Day 2	9.3±1.99	-	-	±0.4 ^{NS}	±1.1*	±1.8**	±2.5**	±3.5
Day 3	9.7±1.56	-	-	-	6.7 ^{NS}	±1.4**	±2.1**	±3.1**
Day 4	10.4±1.71	-	-	-	-	±0.7 ^{NS}	±1.4**	±2.4**
Day 5	11.1±2.33	-	-	-	-	-	±0.7 ^{NS}	±1.7**
Day 6	11.8±1.64	-	-	-	-	-	-	±1.0 ^{NS}
Day 7	12.8±1.64	-	-	-	-	-	-	-

*=Significant difference as P<0.05 **= Significant difference as P<0.01 NS= Non significant

Table 3. Comparison of the mean ±SD of transverse length of kidney in five control dogs.

Days	Mean±SD (mm)	Mean (mm)						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Day 1	3.8±0.84	-	±0.6	±0.9	±0.9	±1.5**	±1.6**	±1.8**
Day 2	4.4±0.89	-	-	±0.3	±0.3	±0.9	±1.0	±1.2
Day 3	4.7±0.75	-	-	-	-	±0.6	±0.7	±0.9
Day 4	4.7±6.97	-	-	-	-	±0.6	±0.7	±0.9
Day 5	5.3±1.40	-	-	-	-	-	±0.1	±0.3
Day 6	5.4±0.89	-	-	-	-	-	-	±0.2 ^s
Day 7	5.6±1.14	-	-	-	-	-	-	-

*=Significant difference as P<0.05 **= Significant difference as P<0.01



References

- Schlondorff; Satriano JA, Trizna W: changes in glomerular and cortical tubular CAMP metabolism in kidney from rat with unilateral ureteric obstruction (ren phy kid r36), 1983 JM Aug; 6,9: 171-85.
- Zelman SJ, Zensoer TV, Davis BB: Renal growth in response to unilateral ureteral obstruction. Kidney Int 23: Sah, 1983.
- Taki M, Goldsmith DI, Spitzer: Impact of age on effect of ureteral obstruction on renal function kidney int: 24: 602, 1983.
- Chevalier RL: Role of renin angiotensin system in renal response to neonatal hydronephros. Pediatr Urol 1983; 13(6):5
- Sawezuk IS, Hoke G, Olsson CA: Gene expression in response to acute unilateral obstruction kidney Int, 1990; 35: 1315.