SHORT COMMUNICATION

HISTOLOGIC EXPLANATION FOR REDUCED FETAL URINE PRODUCTION AND FOR REDUCED AMOUNT OF AMNIOTIC FLUID IN COMPLICATED PREGNANCY

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Summary: Reduction in the production of fetal urine and amniotic fluid has been recognised to have resulted from increased tubular mass in the kidneys of sub-acute or chronically stressed fetuses and from reduced arteriolar lumen size in kidney of acutely stressed fetuses.

Key words: fetal urine amniotic fluid complicated pregnancy histologic explanation

INTRODUCTION

Elliot and Inman (3) while studying volume of liquor amnii in normal and abnormal pregnancy found that in the later liquor volume at any week of gestation was lower than the volume found at the same stage of normal pregnancy. Wlamiroff and Campbell (5) demonstrated reduced urine production rates in the fetuses from complicated pregnancies and attributed it to renal hypoplasia, reduced glomerular filtration rate and/or increased tubular reabsorption.

To the best of our review we have not come across any histopathologic proof for the above well established finding.

While studying the effect of experimental maternal renal insufficiency on the fetus of sheep and goats, certain conclusion with regards to histologic explanation of lowered fetal urine production were made and the same are presented herewith.

MATERIALS AND METHODS

This study was conducted in 34 perinates, 22 being lambs and the rest kids. Amongst these, 2 lambs and 2 kids were from sham operated sheep and goats, whereas, 14 lambs and 4 kids were from subtotal nephrectomised (STN) animals in which about 83 per cent of renal mass was removed following Morrison (4) and Archibald et al (1). These perinates were born in two parturition to these experimental animals first occurring about a month following...
operation and delivering 8 lambs and 2 kids while the second parturition occurred about a year following operation and produced 6 lambs and 2 kids.

Remaining, 6 lambs and 6 kids were surgically removed from total nephrectomized (TN) animals in a period of 4-7 days following operation (in term animals) when these animals appeared terminally sick.

RESULTS AND DISCUSSION

The blood urea nitrogen (BUN) of STN animals was 69 mg%, being about 8 times the normal (9 mg%) while in TN animals BUN evinced a daily rise of about 50 mg%. The amount of amniotic fluid in STN lambs and kids was 283.75±9.83 ml and 261.66±6.15 ml in contrast to their controls which was 296.00 and 305.00 ml respectively.

The kidney sections of perinates from STN mothers on comparison with controls revealed that the sub-capsular glomeruli were farther from capsule, more mature and were surrounded by definitely increased tubular mass (Figs. 1 and 2) yet there was no indication of crescents or increscences.

Fig. 1: Photomicrograph (HE, 80X) kidney of a perinate from a control sheep. The nephrogenesis has ceased but glomeruli are quite near to the capsule (extreme right).

The kidney sections of perinates from TN animals were comparable to control, except for marked degeneration in proximal tubules and arteriolar thickening progressing to more or less complete occlusion of lumen (Fig. 3).
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Fig. 2: Photomicrograph (HE, 80X) kidney of a perinate from a subtotal nephrectomized sheep appearing more mature than kidneys of perinates from normal control sheep as evidenced by maturity of glomeruli, their distance from the capsule (extreme right) and increased tubular mass.

Fig. 3: Photomicrograph (HE, 300X) kidney of a perinate from a total nephrectomised sheep showing an arteriole having more or less complete occlusion of lumen.
The increased tubular mass in the kidneys of the perinates from STN mothers was interpreted as an attempt to overcome the osmotic diuretic action of urea. This also explains as to why fetal urine production is reduced in complicated pregnancies (5). Where BUN level is invariably higher (due to reduced maternal renal function or off feed or toxemia) and urea being freely diffusible will pass across the placenta to fetus where if not counteracted, would cause solute diuresis and hydroaminios.

Such an adaptation by the kidney can be expected in subacute and chronic fetal distress only since in acute distress blood supply to the kidney virtually stops as an attempt to redistribute the blood (2), thus no problem of solute diuresis. Recognition of reduced arteriolar lumen size in TN animals substantiates such contention.

REFERENCES