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Short communication

A concomitant case of unilateral renal agenesis and unihorn uterus in a balb/c mouse

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ABSTRACT

A case of unilateral renal agenesis and unihorn uterus in BalbB/C mice is discussed here. The post mortem examination conducted on naturally dead mice revealed absence of left kidney, ureter and left uterine horn which is rare condition in BalbB/C mice. Microscopically kidney, ureter and uterus did not show any significant histopathological alterations. Different etiologies might be related to such nonlethal genetic defect resulting in abnormal organogenesis.

1. Introduction

Organogenesis of kidney in mice involves three consecutive stages such as early pronephros, then mesonephros, and finally functional metanephros. A Wolffian duct derived uterine bud is important in development of kidney which first invades renal mesenchyme subsequently the metanephric blastema and starts to undergo repeated bifurcations to form collecting duct, minor calyx, major calyx, renal pelvis and ureters (Saxen 1987). Signals from the branching ureterin bud tips in turn induce the loose kidney mesenchymal cells to condense, forming aggregates that epithelialize and fuse together to give rise to a functional nephron. Tubule formation depends on the signals from the ureteric bud. Similarly, the presence of the renal mesenchyme is necessary for the growth and branching of uterine bud. Thus, interactions between the ureteric bud and mesenchyme play vital role in nephrogenesis. (Heardman et al 1994; Sariola 1997).

Unilateral renal agenesis is the congenital absence of one kidney. This congenital defect along with unicorn uterus is a rare finding in animals. A spontaneous case of unilateral renal agenesis along with unihorn uterus in a Balb/c mouse is presented herewith.

2. Materials and methods

A female Balb/c mouse which was to be used in an experiment was kept for acclimatization at Animal House Facility, AIIMS. The animal was found dead and a thorough post mortem examination was done. The organs viz. kidney, ureter and uterus seemed to be involved grossly and were preserved in 10% neutral buffered formalin besides other relevant organs for routine histopathological study (Luna, 1968).

3. Results and discussion

On post mortem examination, the animal exhibited absence of left kidney, ureter (Fig. 1) and left uterine horn. The size of right kidney was normal. Urinary bladder was normal. The kidney, ureter and uterus showed no significant histopathological alterations. These findings probably suggest that the other organs were not physiologically affected to great extent.

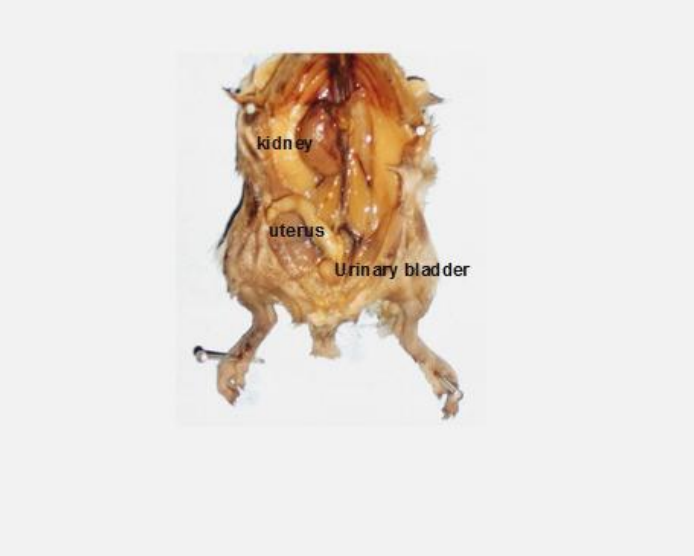

Fig. 1. Balb/c mouse showing a single kidney and uterus.

The results observed in this study are in consonance with the observation of Kreidberg et al (1993) who also opined that this anomaly results from failure of initiation of the pronephros-mesonephros sequence and failure of the ureteric bud to develop. Further, they were also of the view that unilateral renal agenesis may be due to the failure of the Wolffian duct to give off a renal bud after the duct has reached the cloaca during embryogenesis. Non-development of nephrogenic tissue may be the probable explanation of aplastic ureter in the present case, there was marked aplasia of a horn of uterus isolateral with the renal absence which may have resulted from defective Mullerian duct development leading to a unicorn uterus.

Development of kidneys is a multistep and rather complicated process and that many genes are involved in the process. *Wilms' tumor 1* (*WT1*) (Pritchard-Jones et al., 1990), c-ret oncogene (Schuchardt et al., 1994) and *Wnt4* (Stark et al., 1994) are some of the genes involved in renal organogenesis. *WT1* seems to play an important role in the formation of the metanephric mesenchyme in the intermediate mesoderm and subsequent outgrowth of the ureteric bud from the Wolffian duct as stated by Pritchard-Jones et al. (1990). Kamba et al. (2001) has reported a novel renal agenesis model, the highly inbred FUBI (failure of ureteric bud invasion) strain of mice which observed that penetration of the ureteric bud into the metanephric blastema is partially impaired at day 11 of gestation, resulting in unilateral renal agenesis (50%) or lethal bilateral renal agenesis (10%). High doses of

vitamin A and its derivative retinoids have also been linked to human and rodent renal agenesis (Rothman et al., 1995), although these are also sometimes associated with caudal regression (Padmanabhan, 1998).

4. Conclusion

In present case study rare finding of unilateral renal agenesis and unihorn uterus was observed in BalbB/C mice which might be related to multifactorial reasons as disturbances of gene regulation or other exogenous factors resulting in nonlethal genetic defect and subsequent abnormal organogenesis as evinced by postmortem and histopathological examination.

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