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ANATOMICAL MALFUNCTIONING OR MISCONFIGURATION IN TERATOGENIC EMBRYO: A REVIEW

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ABSTRACT

Teratology deals with persistent developmental defects that have manifest subsequent parturition. It is still regarded as a science that addresses principally issues of anatomical anomalies. During the first month of pregnancy, the fetus develops the majority of its organ systems. Abnormalities occurring within this period can cause serious functional defects. The latter portion of the pregnancy focuses on growth and maturation of the already existing fetal body and its organs. Defects during this phase may be less severe.

KEYWORDS: Embryo, Teratogenicity.

INTRODUCTION

Teratology is a specialized area of embryology. It is the study of the etiology of abnormal development (the study of birth defects). Defects in the sequential steps of development may lead to embryonic loss, fetal death, fetal mummification, abortion, stillbirth, birth of nonviable neonates, or birth of viable offspring with defects (James, 1973).

ETIOLOGY

Chromosomal abnormalities occurring during gametogenesis or fertilization may result in embryo lethal anomalies, or occasionally in abnormal but viable offspring. Errors in oogenesis can be associated with increased maternal age in several species and may result in failure of fertilization, reduced embryo viability, or in deficiencies that are expressed during fetal development. Chromosomal errors such as trisomy have been reported in veterinary medicine, and increasing availability of karyotyping and ancillary chromosomal analysis have increased recognition of these defects (King *et al*., 2006). Aging of gametes following suboptimal timing of insemination represents another source of chromosomal abnormalities leading to errors in embryonic and fetal development. All cells of the defective embryo may be aneuploid, or various degrees of mosaicism may exist.

SOME COMMON CONGENITAL DISEASES

Amelia: is the birth defect of lacking one or more limbs. It can also result in a shrunken or deformed limb (Gershoni *et al*., 1990). The complete absence of an arm or leg in amelia occurs as a result of the limb formation process being either prevented or interrupted very early in the developing embryo. Sometimes, amelia may be caused due to health complications during the early stages of pregnancy, including infection, failed abortion or complications due to use of Thalidomide (Zlotogora *et al*., 1993). Amelia may be present as an isolated defect, but it is often associated with major malformations in other organ systems. These frequently include cleft lip or palate, body wall defects, malformed head and defects of the neural tube, kidneys, and diaphragm. Facial clefts may be accompanied by other facial anomalies such as abnormally small jaw and missing ears or nose (Basaran *et al*. 1994).

Atresia: Atresia is a condition in which an orifice or passage in the body is abnormally closed or absent. There are different types of atresia such as Imperforate anus in which there is malformation of the opening between the rectum and anus (Pena and Levitt, 2006). Microtia in which there is absence of the ear canal or failure of the canal to be tubular or fully formed (Vrabec and Lin, 2010). Intestinal atresia refers to malformation of the intestine, usually resulting from a vascular accident in utero (Mishalany and Kaloustian, 1971). Pulmonary atresia indicates malformation of the pulmonary valve in which the valve orifice fails to develop (Ahmed *et al*., 2012).

Cryptochordism: is the absence of one or both testes from the scrotum. It is the most common birth defect of the male genitalia (Cytryn *et al*., 1967). In unique cases,

cryptorchidism can develop later in life, often as late as young adulthood. A testis absent from the normal scrotal position can be found, along the "path of descent" from high in the posterior (retroperitoneal) abdomen, just below the kidney, to the inguinal ring (Wood and Elder, 2009). Undescended testes are associated with reduced fertility, increased risk of testicular germ cell tumors and psychological problems. Undescended testes are also more susceptible to testicular torsion and inguinal hernias.

Hydrocephalus: is a medical condition in which there is an abnormal accumulation of cerebrospinal fluid (CSF) in the brain. This causes increased intracranial pressure inside the skull and may cause progressive enlargement of the head. It was once informally called "Water on the brain" (Nimjee *et al*., 2010). Two types of hydrocephalus are commonly described non-communicating hydrocephalus and communicating hydrocephalus, although there is evidence that communicating forms can lead to obstruction of CSF flow in many instances In non-communicating hydrocephalus, the CSF in the ventricles cannot reach the subarachnoid space. This results from obstruction of interventricular foramina, cerebral aqueduct, or the outflow foramens of the fourth ventricle (median and lateral apertures). The most common obstruction is in the cerebral aqueduct. In communicating hydrocephalus, the obstruction of CSF flow is in the subarachnoid space from prior bleeding or meningitis. This causes thickening of the arachnoid leading to blockage of the return-flow channels. In some patients, the spaces filled by CSF are uniformly enlarged without an increase in intercranial pressure.

Kyphosis: refers to the abnormally excessive convex *kyphotic* curvature of the spine as it occurs in the thoracic and sacral regions (Fon *et al*., 1980). Inward concave curving of the cervical and lumbar regions of the spine is called lordosis. It can result from degenerative diseases such as arthritis; developmental problems, most commonly osteoporosis with compression fractures of the vertebrae, or trauma. While most cases of kyphosis are mild and only require routine monitoring, serious cases can be debilitating (Keller *et al*., 2003). High degrees of kyphosis can cause severe pain and discomfort, breathing and digestion difficulties, cardiovascular irregularities, neurological compromise and, in the more severe cases, significantly shortened life spans.

SUMMARY

Teratology is a science that has undergone relatively recent maturation and expansion. Anomalies in the earliest stages of the embryo generally lead to embryonal/fetal death.

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