ISSN: 2583-9365

Murine dystocia and surgical management

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Abstract

An eight-month-old female BALB/c mouse housed and maintained in the Animal Facility of National Brain Research Centre, in accordance with the Committee for Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines, was found to be sick and in distress during the daily health surveillance by a veterinarian. It was found to have delivered four live pups on the previous day. Physical examination of the mouse revealed some membranous mass hanging from the vagina. In addition, there was difficult breathing, distension of the abdomen, head pressing, slightly pale mucus membranes, dehydration and the mouse was minimally responsive to any stimuli. The vulva and vaginal canal were examined for presence of any pups but there were none visible. The abdomen was palpated to confirm presence of pups. After complete clinical examination of the mouse, the condition was diagnosed as 'dystocia'. Four live pups born on the previous day were fostered with a mother which had delivered on the same day to prevent further pain and suffering to the mouse. A caesarean section was planned on emergency basis to remove foetus from uterus. Post-operatively mouse was maintained on cephalexin and meloxicam daily for five days along with antiseptic dressing of surgical wound with povidone iodine daily for seven days till removal of skin sutures. There was uneventful recovery of mouse ten days after surgery.

Key words: BALB/c mouse, dystocia, caesarean

Introduction

Dystocia refers to difficulty in passing the foetus through the pelvic canal and it is a common small animal emergency. The causes of dystocia have been reported to be either maternal or foetal in origin (Arthur *et al*., 1996). Some of which may be inadequately dilated vaginal canal, exhaustion of dam, large sized pups, abnormal presentation of pup during delivery or dead pups. Difficulty in delivery of pups is also one of the most common and clinically difficult conditions in mouse and some clinical signs of dystocia include a pup visible in the vaginal canal but not being passed, immobility, dehydration, distension of the abdomen with little muscle tone or labor for an extended period of time (Burkholder *et al*., 2012). If the condition of the pregnant mice and the foetuses is stable and the position of the foetus is proper with no obstruction in the vaginal canal, veterinary management may be considered with uterotonic (or ecbolic) agents like oxytocin and assisted foetal extraction. Though, oxytocin has been widely used in humans and animals, it may be contraindicated in many cases of murine dystocia as endogenous oxytocin is not found to be necessary for parturition in mouse and limited evidence supports its efficacy as an ecbolic agent in this species (Narver, 2012). However, surgery is advisable when dystocia is due to obstruction, primary uterine inertia or prolonged labor or when veterinary management is not of any help, especially in mouse which are valuable and cannot be euthanized.

Timely and appropriate interventions for dystocia, either medical or surgical, are crucial for both maternal and fetal survival. This article describes the caesarean section, anaesthetic procedures and postoperative management for the BALB/c mouse with dystocia.

History

An eight-month-old female BALB/c mouse housed and maintained in the Animal Facility at the National Brain Research Centre, Manesar, Haryana in accordance with the Committee for Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines, was found to be sick and in distress during the daily health surveillance by a veterinarian. Four live pups were found in the cage which according to the animal care staff, the animal delivered late in the evening on the previous day. Physical ex-

amination of the mouse revealed some membranous mass hanging from the vagina (Fig. 1). In addition, there was difficult breathing, distension of the abdomen, head pressing, slightly pale mucus membranes, dehydration and the mouse was minimally responsive to any stimuli. The vulva and vaginal canal were examined for presence of any pups but there were none visible. The abdomen was palpated to confirm presence of pups. After complete clinical examination of mouse, the condition was diagnosed as 'dystocia'. The four live pups born on the previous day were fostered with a mother which had delivered on the same day to prevent further pain and suffering in the mouse, a caesarean section was planned on emergency basis.

Treatment

Caesarean section was planned on emergency basis to prevent further suffering in the mice which was anaesthetised with ketamine (80 mg/kg body weight) and xylazine (8 mg/kg body weight) administered by careful intraperitoneal injection. Pre-anaesthetic atropine (0.04 mg/kg body weight) and meloxicam (5 mg/kg body weight) were administered subcutaneously 15 minutes before administrating anaesthesia. Hydration status of mice was assessed and 0.5 ml of warm normal saline was administered subcutaneously. Animal was restrained in dorsal recumbency. The surgical site was prepared for aseptic surgery. The animal was placed on a warm water blanket and vital parameters i.e temperature, respiration rate, heart rate and reflexes were monitored regularly. The uterus was approached through caudal paramedian incision just 0.3 inches posterior to umbilicus. Uterus was exteriorized (Fig. 2) and an incision was made on the dorsal aspect in the least vascular area of uterus and two dead foetus, one of which was completely developed and other macerated were removed (Fig. 3). After washing with sterile Normal Saline, uterus was sutured by using 4-0 chromic catgut in simple Lambert pattern. The muscles layer was closed using 3-0 polyglycolic acid suture (Vicryl) in simple interrupted pattern and skin was closed using 3-0 silk in simple interrupted pattern (Fig.4). Post-operatively, the mice was observed twice daily for any signs of pain or discomfort. Antibiotic cephalexin (60 mg/kg body weight PO, bid) and analgesic meloxicam (5 mg/kg body weight, once daily) was given subcutaneously for five days. Antiseptic dressing of surgical wound was done by povidone iodine daily for seven days till removal of skin sutures. There was uneventful recovery of the mice after ten days of surgery (Fig. 5).

Fig 1. Membranous mass hanging from vagina.

Fig 2. Uterus exteriorized from abdominal cavity.

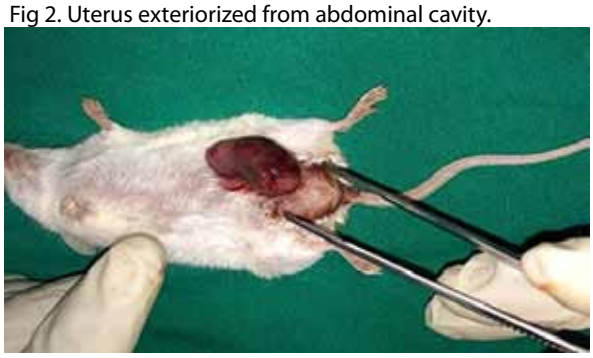

Fig 3. Removal of dead foetus.

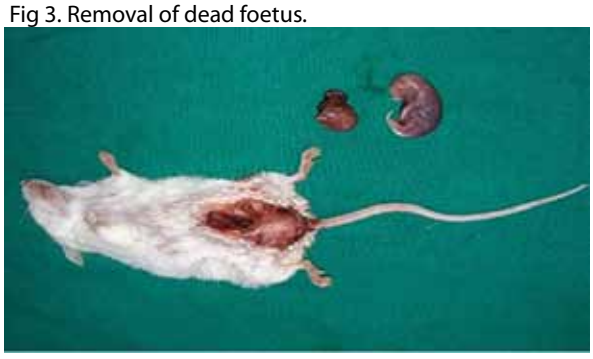

Fig 4. After closing the laparotomy incision.

Fig 5. After recovery.

Discussion

Dystocia means difficult birth or incapability to expel foetuses through the birth canal. The aetiology of dystocia may be maternal or foetal. Usually, mice which are about to deliver should not be disturbed as stress due to disturbances like cage change, frequent handling, noise etc may lead to

interrupted labor and dystocia. In mice, dystocia cases are usually observed during the early morning health surveillance as they often deliver their pups during the night. If a pup is seen stuck in the vaginal canal, it may be removed by applying gentle traction on the pup after applying a suitable lubricant around it. However, if the mother is found to be weak, there are fewer chances that she will push out the remaining pups on her own. In such cases, caesarean delivery of the pups is recommended which are then fostered with another breeder which has pups of almost the same age. Gilson (2003) reported that surgical intervention is required in around 60–80% of dystocia cases in the bitch and queen and Moon *et al*., (1998) reported that 58% the of caesarean sections were performed on an emergency

basis. However, in case of breeding colonies of laboratory mice, euthanasia of even mildly affected mice may be the preferred option, because animals with dystocic tendencies are generally not preferred for the breeding or experimental animal pool. However, caesarean delivery of pups is recommended for valuable research mice which are critical for study and cannot be euthanized (Narver, 2012).

In this case, four live pups delivered by the mouse on previous day were fostered with another BALB/c mouse who had pups of same age and caesarean delivery of pups remaining in uterus was done on emergency basis to prevent further pain, distress and suffering in the mouse. It was found that dystocia in this BALB/c mouse was caused due to extreme weakness after prolonged labor and presence of two dead pups in the uterus, one of which was macerated. A similar case has also been reported by Hajurka *et al*., (2005) in bitch. Analgesia should be provided whenever invasive painful surgeries are performed and meloxicam was used in this case both pre-emptively as well as postoperatively to alleviate pain. Cephalexin was also administered to prevent any secondary infections. Softened pellet diet was provided for 2-3 days after surgery. The BALB/c mouse recovered completely within 10 days of surgery with no complications and the pups fostered with another mother also survived and were healthy.

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