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Computed tomography after mild head trauma in dogs

S. R. PLATT, S. T. RADAELLI, J. J. MCDONNELL

SEVERE head trauma is associated with high mortality in human beings and animals (Dewey 2000, Ghajar 2000). The appropriate therapy for head trauma remains controversial in veterinary medicine because of a lack of retrospective studies on the treatment of dogs and cats with head trauma. The most important considerations in cases of head trauma are the nature and extent of brain injury. Brain injuries can include concussion, contusions and lacerations, intracranial haemorrhage and cerebral oedema. However, it is often difficult to assess the presence and clinical effect of these injuries. The modified Glasgow Coma Scale (MGCS) has been proposed as a means of evaluating objectively the neurological status of dogs after head trauma (Shores 1983). The scoring system has recently been validated in dogs, and provides a linear correlation with prognosis (Platt and others 2001). Thus, the dog's score at any given time may be an indication of the severity of the underlying brain injury: a score of 3 to 8 indicates a severe injury, a score of 9 to 14 indicates moderate injury and a score of 15 to 18 indicates mild injury. This suggests that an aggressive diagnostic investigation may not be necessary in the third group of patients, but this has not been confirmed.

Computed tomography (CT) has become a mainstay in the diagnostic work-up of all grades of human head trauma patients (Stein and Ross 1990, Nagy and others 1999). However, the decision as to when to recommend such imaging techniques has not been evaluated in veterinary medicine. The aim of this study was to evaluate the abnormalities detectable by CT in dogs with mild injuries after head trauma.

Dogs were selected on the basis of fulfilment of the following criteria: admission within 24 hours of a head trauma; complete neurological examinations upon admission; a MGCS score of 15 to 18; CT of the head carried out within 24 hours of admission. Using the neurological examinations that had been documented in the records, a MGCS score was assigned to each dog based on the proposed scoring system (Table 1) (Shores 1983). Scoring was acceptable only if recorded at the time of admission, and before medication and supportive care were administered. Scoring was based on evaluation of the level of consciousness, motor activity and brainstem reflexes. Each of these three areas of the neurological examination received a score of 1 to 6. According to the observations made, the animal's total score therefore ranged from 3 to 18. Dogs with asymmetrical abnormalities were assigned the lower of the two possible scores. The CT scans were blindly evaluated, and abnormalities were documented as they were interpreted.

Seventy-six cases of dogs with documented head trauma were retrieved from the medical records. Ten of the 76 dogs fulfilled the above criteria and were all classified as mild head trauma cases. The results indicated abnormalities in nine of the 10 cases. These abnormalities included fractures in eight of the nine cases (89 per cent), hydrocephalus in four cases (44 per cent), parenchymal damage in three cases (33 per cent), haemorrhage in one case (11 per cent) and mass effect in one case (11 per cent). The fractures that were detected were subdivided by location and type. The fractures were located in the frontal bone (one case), parietal/temporal bone (three cases), multiple bones (three cases) and osseous bulla (one case). The types of fractures were depressed (four cases), linear (one case), elevated (one case) and compound (two cases). Of the cases with hydrocephalus, one was unilateral and the other three were bilateral and asymmetrical. The haemorrhage noted in one case was epidural in location and was associated with multiple calvarial fractures.

The cases were not evaluated to determine whether the results of CT changed the therapeutic approach or whether this would potentially alter the outcome of each case. This is an area that should be addressed in veterinary medicine. However, it would seem from the high percentage of abnormalities noted that an imaging method such as CT may be valuable in all cases of canine head trauma, however mild the neurological signs may appear on initial examination.

TABLE 1: Modified Glasgow Coma Scale scoring system

Area of neurological examination	Score
Motor activity	
Normal gait and spinal reflexes	6
Hemiparesis, tetraparesis or decerebrate activity	5
Recumbent, intermittent extensor rigidity	4
Recumbent, constant extensor rigidity	3
Recumbent, constant extensor rigidity with opisthotonus	2
Recumbent, hypotonia of muscles, depressed or absent spinal reflexes	1
Brainstem reflexes	
Normal pupillary light reflexes and oculocephalic reflexes	6
Slow pupillary light reflexes and normal to reduced oculocephalic reflexes	5
Bilateral, unresponsive myosis with normal to reduced oculocephalic reflexes	4
Pinpoint pupils with reduced to absent oculocephalic reflexes	3
Unilateral, unresponsive mydriasis with reduced to absent oculocephalic reflexes	2
Bilateral, unresponsive mydriasis with reduced to absent oculocephalic reflexes	1
Level of consciousness	
Occasional periods of alertness and responsive to environment	6
Depression or delirium, capable of responding but response may be inappropriate	5
Semicomatose, responsive to visual stimuli	4
Semicomatose, responsive to auditory stimuli	3
Semicomatose, responsive only to repeated noxious stimuli	2
Comatose, unresponsive to repeated noxious stimuli	1

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