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Technically Speaking

The Modified Glasgow Coma Scale

What is the MGCS?

The Glasgow Coma Scale (GCS) was created in 1974 by Graham Teasdale and Bryan Jennett as an objective way to assess the level of consciousness in humans with traumatic brain injury and coma at initial and subsequent evaluations. This scale was modified for veterinary use by Andy Shores, Chief of Neurosurgery and Neurology at the Mississippi State University College of Veterinary Medicine, in 1983. Along with the Small Animal Coma Scale (SACS), the Modified Glasgow Coma Scale (MGCS) was proposed as a means of objectively evaluating the neurological status of dogs after traumatic brain injury. The score is a useful way to monitor progression of neurologic deficits, effects of therapeutic measures and to assess overall prognosis.

The MGCS is performed following a neurologic examination and is an objective way to evaluate neurologic function. It is comprised of three categories: motor activity, brainstem reflexes and level of consciousness. Each category is scored 1-6 with 1 ibeing indicative of more severe dysfunction. The scores from each category are added together to establish a coma score. See table below for the particulars of the MGCS.

Modified Glasgow Coma Scale		
		SCORE
Motor Activity	Normal gait, normal spinal reflexes	6
	Hemiparensis, tetraparesis, or decerebrate rigidity	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 PLR and oculocephalic reflexes	6
	Slow PLR and normal to reduced oculocephalic reflexes	5
	Bilateral unresponsive miosis 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
MCGS Score		SCORE
	3-8	grave
	9-14	guarded
	15-18	good

Application of the Coma Scale

It is good practice to use the MGCS on any patient that we encounter, but it is best utilized in patients with changes in level of consciousness (dull, obtunded, stuporous, comatose) or a recent history of head trauma. In these patients, the scale becomes a useful indicator of the severity and progression of neurologic dysfunction and may be a helpful prognostic indicator. As a patient's condition can rapidly change, the MGCS can be performed throughout the patient's hospital stay to help guide the medical team in treatment decisions and better communicate prognostic information to the owner.

Prognosis of Scale Use

In veterinary medicine, the MGCS is best known for evaluating severity of brain injury, progression of the injury, effects of therapy and predicting prognosis following head trauma and traumatic brain injury (TBI). This scaling system has been shown to have prognostic applications in canine head trauma patients (Platt et al. 2001; Sharma and Holowaychuk 2015). Prognosis improves with higher scores and declines with lower scores with 50% mortality (related to head injury) in the first 48 hours with a score of 8 (Platt et al. 2001). In fact, the MGCS has been shown to be the best predictor of survival when compared to the Animal Trauma Triage (ATT) Score and multiple clinicopathologic parameters, with a MGCS of <11 having a sensitivity of 84% and specificity of 73% for predicting non-survival to hospital discharge (Sharma and Holowaychuk 2015).

Future Directions

Smartphone technology has made it easier for veterinarians to find and share information. In 2014, a Small Animal Coma Scale App was created by Andy Shores. Veterinarians can use the app to score a patient and later submit patient outcome in reply to a follow up email. This app will facilitate a large collection of data regarding patient outcome so that we may better understand how different aspects of the scoring system contribute to prognosis.

Newer modified versions of the MGCS are also in the process of being validated. One of these, under development by Simon Platt, is being utilized by Bush Veterinary Neurology Service in a clinical study to evaluate whether this scale may yield prognostic information for dogs with meningoencephalitis of unknown etiology (MUE), a common and devastating disease of the central nervous system.

Final Thought

The MGCS can be implemented as an extension of the neurological examination to more objectively determine progression of signs in patients with brain dysfunction. This information helps the veterinarian make better treatment decisions and, in cases of head trauma, prepare the owner with prognostic information.

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