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COMA AND ITS CAUSES AND TREATMENTS: A LITERATURE REVIEW

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Abstract: Every day, new patients find themselves in a state of deep unconsciousness - coma. It is therefore of the utmost importance for health professionals to have a thorough knowledge of the main causes of this pathological condition, which revolve around physical and substantial injuries that affect the brain's center of consciousness, the arousal center or the tracts that connect them. In addition, it is interesting to have a full understanding of the treatments that these patients must undergo, which can range from simple glucose replacement to neurosurgical intervention, depending mainly on the cause of the problem. So the aim of this work is to facilitate the search for information on the subject, summarizing all the pathophysiology and management of coma with information obtained from national and international bibliography.
Keywords: Unconsciousness. Neurology. Treatment.
Thematic area: Neurological emergency

INTRODUCTION

Neurological emergencies, especially coma, represent critical situations that require immediate medical intervention to prevent permanent damage to the central nervous system and potentially save lives. Coma, also known as persistent vegetative state, is a deep state of unconsciousness where the patient does not respond to external stimuli and does not have sleep-wake cycles. It can be caused by various conditions, such as head trauma, strokes, brain infections, poisoning or metabolic diseases, dysfunction of both cerebral hemispheres or of the reticular activating system. Rapid identification and treatment of the underlying causes are crucial to improving the patient's prognosis, involving a multidisciplinary approach that includes neurologists, intensivists and other specialists. The aim of this paper is to explore the causes and mechanisms that lead to coma, as well as to discuss best practices for diagnosis and treatment in neurological emergencies. It aims to provide a thorough understanding of clinical approaches, emphasizing the need for rapid interventions and continuous monitoring to optimize patient outcomes. In addition, the study seeks to review the current literature on the subject, highlighting recent advances and identifying areas that need further investigation to improve medical practice.

METHODOLOGY

This study was carried out through a review of national and international scientific literature published between 2016 and 2019. To do this, we used the article "Initial diagnosis and management of coma", published on the National Library of Medicine (PubMed) website, found using the terms "coma", "treatments" and "causes". In addition, the book "Semiologia médica" by Celmo Porto was also one of the bases for this work, in which the search criteria were works that have high amounts of information on the causes and treatments for coma.

THEORETICAL BACKGROUND

According to Traub et al. (2016), coma is defined as a state of profound unconsciousness in which the individual cannot be awakened. It can be caused by various situations that affect **the brain's center of consciousness**, the **arousal center** or the tracts that connect them. The comatose condition is considered a medical emergency, resulting from a compromise in the ascending reticular activating system (ARAS). This system connects the dorsal pons, midbrain, thalamus and cerebral cortex and is crucial for maintaining wakefulness and consciousness. Comatose patients may experience cycles of awakening without consciousness (open-eye coma). The state of coma can be difficult to quantify, and some patients diagnosed as comatose may be mini-

Coma			
	Diffuse Neuronal Dysfunction		
Structural	**Toxic**	**Metabolic**	**Coma Mimics**
Neoplasia	Sedative-hypnotics agents	Respiratory insufficiency	Locked-in syndrome
Hydrocephalus	Opioids	Dysthermia	Neuromuscular paralysis
Intracranial hemorrhage	Dissociative agents	Dysglycemia	Akinetic mutism
Vascular occlusion	Carbon monoxide	Electrolyte disorders	Psychogenic unresponsiveness
	Toxic alcohols	Infection	
	Antidepressants	Hypothyroidism	
	Antiepileptics	Thiamine deficiency	
	Agents of histotoxic hypoxia	Nonconvulsive status epilepticus	
	Simple asphyxiants		
	Serotonin syndrome		
	Neuroleptic malignant syndrome		
	Clonidine		

Table summarizing the main causes of coma.

Initial Diagnosis and Management of Coma - PubMed (nih.gov)

Variables Score			
	Eye opening	Spontaneous	4
		To the voice	3
		To pain	2
		None	1
	Verbal response	Oriented	5
		Confused	4
		Inappropriate words	3
		Incomprehensible words	2
		None	1
	Motor response	Obey commands	6
		Locate the pain	5
		Withdrawal movements	4
		Normal bending	3
		Abnormal extension	2
		None	1
	Pupillary response	None	2
		Only one reacts to the light stimulus	1
		Bilateral reaction to stimulus	0

Table with the Glasgow coma scale.

Lines of Care - Glasgow Coma Scale (saude.gov.br)

mally conscious or more conscious than can initially be tested or assumed. Coma has two different types, **physiological** and **induced**, however both have the same general perspective, which is defined as a state in which the human being is unable to interact properly with the external environment, as a consequence of their diminished neural activity. Induced coma, for example, is a type of deep sleep brought on by sedative drugs. It may be necessary when the patient has a very serious or delicate health condition, such as complicated surgeries like neurosurgeries and cardiovascular surgeries, for example. Regarding the causes of coma, it is important to note that they are diverse and not always understood, classified into **structural causes**, in cases of pressure in key areas or obstruction of blood flow, generally related to injuries involving both cerebral hemispheres, such as strokes,

both hemorrhagic and ischemic, and traumas (direct mechanical injuries to the skull of a human being) or **diffuse causes**, such as toxic or metabolic neuronal dysfunctions, including the abuse of drugs and toxic substances, such as excessive alcohol causing alcoholic coma. Lack of cerebral oxygenation, usually due to pulmonary insufficiency, can also lead to coma, or even excessive inhalation of carbon monoxide from car engines or home heating systems. Numerical scales are used to determine the severity of coma, the most widely used in emergencies being the **Glasgow coma scale**, published in 1974 by Graham Teasdale and Bryan J. Jennett, members of the Glasgow Institute of Neurological Sciences. The Glasgow scale's criteria include eye opening, verbal response, motor response and pupillary reflex, ranging from 1 to 15, with 1 being a deep coma and 15 being normal consciousness, with an additional score of <8, which suggests intubation. Treatments are specific based on the cause of the coma, for example, if it is caused by **head trauma, strokes or neoplasms**, surgical interventions are performed to relieve intracranial pressure or remove hematomas, when **induced by drugs or toxic substances**, specific antidotes are administered, when **hypoglycemic**, intravenous glucose is administered, when caused by **infectious or septic** conditions, aggressive antibiotic therapy is used. In addition to specific treatment, comatose patients undergo airway stabilization (usually with intubation), circulation monitoring and electrolyte and glucose levels are corrected. While vital signs are monitored, intracranial pressure is also monitored and drugs are used to reduce cerebral edema in cases of structural coma, while in cases of epileptic coma, seizure treatments are used with the administration of anticonvulsants to prevent or control epileptic seizures.

FINAL CONSIDERATIONS

From this summary, it is clear that health professionals need to know how to classify severity according to the Glasglow table, identify the causes, whether structural or diffuse, and treat coma. Since the state of profound inconsistency studied here is considered a neurological emergency that requires immediate medical intervention. It is therefore essential to be aware of new research into the treatment of coma, since it is carried out in a way that is specific to its cause, in order to prevent the patient from permanent damage to the central nervous system.

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