orphanaesthesia

Anesthesia recommendations for

Joubert syndrome

Disease name: Joubert syndrome

ICD 10: Q04.3

ORPHAcode: 475

Synonyms: CPD IV, Cerebelloparenchymal disorder IV, Classic Joubert syndrome, Joubert syndrome type A, Pure Joubert syndrome, Vermis-agenesis, Joubert-Boltshauser syndrome

Disease summary: Joubert syndrome (JS) is a rare autosomal recessive disorder whose main clinical signs are muscular hypotonia, ataxia, mental retardation, abnormal eye movements and a respiratory pattern of alternating hyperpnea-apnea [1,2].

First described in 1969, the prevalence is estimated to be 1 in 100,000 [3,4].

JS is defined by a characteristic cerebellar and brainstem malformation, especially by the partial or complete agenesis of the cerebellar vermis – the structure connecting both parts of the cerebellum. Furthermore, other bordering parts of the cerebellum can also be involved [5-7].

The clinical course shows an abnormal breathing pattern (episodic tachypnea and/or apnea) and nystagmus, with onset during the neonatal period. The breathing pattern is characterized by effortless hyperventilation, which is more conspicuous in the awake state and intensifies after stimulation. Paroxysmal hyperventilation is often punctuated by intermittent central apnea. However, abnormal respiratory pattern is not a consistent finding, and respiratory distress in the proper sense is not a feature. During infancy, muscular hypotonia can be observed, and later cerebellar ataxia (staggering gait and imbalance) may develop. Delayed motor function development is common, and cognitive function ranges from normal intelligence to severe deficits. Oculomotor apraxia and seizures may occur. Additional findings can include renal disease, ocular colobomas, occipital encephalocele, hepatic fibrosis, oral hamartomas, and endocrine abnormalities [2,3,8,9].

Physical characteristics are: Large head, prominent forehead, high rounded eyebrows, epicanthal folds, an upturned nose with prominent nostrils, palate malformations, laryngomalacia, micrognathia, an open mouth (with oval, 'rhomboid' and finally triangular shape), tongue protrusion and rhythmic tongue motions, and occasionally low-set and tilted ears. Other features sometimes present in Joubert syndrome include retinal dystrophy, and polydactyly [2,3,8,9].

Diagnosis is based on the main clinical features. These must be accompanied by the presence of a neuroradiological hallmark, designated as the “molar tooth sign" (MTS) on magnetic resonance imaging (MRI). In view of the complex genetic heterogeneity, mutations are only found in about 50% of patients at present [7,10].

Diagnosis may be incorrect; if uncertainty exists, the diagnosis should be re-evaluated.

Every patient is unique; individual circumstances must always guide clinical care.

Medicine is in progress; new clinical knowledge may not be yet reflected in this recommendation.

Recommendations are not rules or laws; they provide a framework to support clinical decision-making. Although this recommendation has passed a structured review process, it does not meet the formal criteria of a guideline.

Translations may not always reflect the most recent updates of the English version.

Find more information on the disease, its centers of reference and patient organizations on Orphanet: www.orpha.net

Emergency information

A	**AIRWAY / ANESTHETIC TECHNIQUE**	Macroglossia may occur; therefore, RA (with or without analgosedation) may be preferred.
B	**BLOOD PRODUCTS (COAGULATION)**	Not reported.
C	**CIRCULATION**	Not reported.
D	**DRUGS**	Respiratory depression should be avoided, and neuromuscular monitoring is recommended if neuromuscular blocking agents are administered.
E	**EQUIPMENT**	Not reported.

Typical surgery and procedures

Diagnostic procedure: MRI.

Oral and maxillofacial surgery: Maxillary aberrations, dental malposition, dental extractions; Neurosurgery: ventricular shunts (rare); Ophthalmology: strabismus and retinal surgery; General surgery: implantation of peritoneal dialysis catheter, liver and renal transplantation due to loss of function. Orthopedic surgery: scoliosis surgery.

Type of anesthesia

Up to now, there are only some reports about anesthesia in patients with JS in the literature. Those were basically reported to be uneventful. Although volatile anesthetics and opioids are discussed to increase postoperative breathing problems, so far a recommendation for either volatile or intravenous anesthetic agents cannot be made. Short-acting agents are preferred. The use of α2-agonists has been reported [11-21].

Regional anesthesia is strongly recommended, but mostly in combination with sedation, because of the psychological disturbances of the patients.

This is especially true because emotional stress can trigger breathing difficulties like tachypnea or apnea in these patients [3].

Necessary additional preoperative testing (beside standard care)

Routine preoperative testing depends on comorbidity of the patients. Mostly no particular tests are necessary, beside the standard routine approach.

In case of renal or hepatic involvement, renal and hepatic function have to be assessed.

Particular attention should be turned to medical history and physical examination. A history of hyperpnea, tachypnea, and apnea in the past has to be evaluated. Furthermore, tongue protrusion, small mouth opening, and mobility of the cervical spine as signs for difficult intubation conditions have to be recognized.

Particular preparation for airway management

Airway management should not be a special problem in the majority of patients. If there are any physical signs for possible difficult intubation conditions, the usual precautions must be taken, and common tools to secure the difficult airway should be held for immediate use.

Awake fiberoptic intubation is not recommended because of the often diminished or absent patient cooperation. If necessary, fiberoptic intubation should be performed in the anesthetized patient.

Particular preparation for transfusion or administration of blood products

Not reported.

Particular preparation for anticoagulation

Not reported.

Particular precautions for positioning, transportation and mobilization

Not reported.

Interactions of chronic disease and anesthesia medications

Not reported.

Anesthetic procedure

Avoid premedication with drugs depressing respiratory function.

Propofol was used without any adverse effects. For volatile anesthetics possible prolongation of postoperative breathing problems has been discussed. Inhalational anesthesia induction may induce apnea.

Depth of anesthesia can be monitored by using electroencephalography-based devices.

The use of long-acting opioids should be avoided because of their depressant effect on respiratory function.

In case of immobilization, succinylcholine should be avoided.

Non-depolarizing muscle relaxants should be administered with caution and appropriate monitoring or be avoided because of existing muscular hypotonia.

For postoperative analgesia and to avoid opioids, local or regional anesthesia is strongly recommended. This often has to be performed under (or combined with) general anesthesia or sedation.

Clonidine may increase the incidence of apneic episodes and should only be used with appropriate monitoring. There are reports about the successful administration of dexmedetomidine.

Possibly caffeine or theophylline decrease the incidence of apneic episodes, but data is limited.

Particular or additional monitoring

There are no reports for particular monitoring in patients with JS in addition to routine monitoring, which should include neuromuscular monitoring.

Monitoring of the depth of anesthesia using electroencephalography-based devices may be helpful.

Possible complications

Patients with JS are at risk for the need of difficult airway management, mainly because of macroglossia [15,16,20,21].

Hyperpnea and tachypnea, and apneic episodes are common and may influence and prolong postoperative course [15,16,20,21].

Postoperative care

There is a need for postoperative monitoring of breathing frequency and oxygen saturation.

Duration of postoperative monitoring should be discussed for every single case. It depends on the type of surgery, the need of postoperative pain therapy (especially if opioids have to be used), and the administered anesthetic drugs.

In some cases, postoperative intensive care may be necessary; however, an ambulatory setting may also be possible [12,13].

Disease-related acute problems and effect on anesthesia and recovery

Hyperpnea and tachypnea as well as apneic episodes are typical disease characteristics and possible side effects of anesthetics and opioids. Differentiation of the causative trigger may be difficult [1,3].

Ambulatory anesthesia

Ambulatory anesthesia (according to common guidelines) is possible under certain circumstances [13,19]. These include the careful use of neuromuscular blocking agents and the avoidance of long-acting opioids, the performance of a potent regional anesthesia, stable postoperative respiratory conditions and a competent home care.

Obstetrical anesthesia

Up to now there are no reports about obstetrical anesthesia in patients with JS.

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