orphanaesthesia

Anaesthesia recommendations for patients suffering from

Collagen VI-related myopathy

Disease name: Collagen VI-related myopathy

ICD 10: G71

Synonyms - Spectrum of phenotypes:

Mild: Bethlem myopathy/ benign congenital muscular dystrophy

Intermediate: Limb-girdle muscular dystrophy; myosclerosis myopathy

Severe: Ullrich myopathy/ congenital atonic sclerotic muscular dystrophy

First described by Ullrich in 1930 and Bethlem in 1976 respectively [1]. Caused by mutations in any of the 3 genes which code for collagen type VI synthesis, COL6A1, COL6A2 and COL6A3 [2]. Collagen VI is a major contributor to stability of the extracellular matrix. The remaining function of Collagen VI determines the clinical severity of the disorder [3,4]. Considered different entities in the past, Bethlem and Ullrich myopathy are now considered extremes in the spectrum of Collagen VI myopathy. Both inheritance (mostly autosomal recessive) and de-Novo mutations (mostly autosomal dominant) are possible, the latter is more common. Combined prevalence is estimated at approximately 1 in 100,000 births (Varying data for subtypes). Diagnosis relies on muscle biopsy and molecular genetic testing. There exists no causative treatment.

Medicine in progress

Perhaps new knowledge

Every patient is unique

Perhaps the diagnostic is wrong

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

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Disease summary

In Bethlem myopathy, patients will experience moderate muscle weakness, peripheral joint laxity and proximal joint contractures. Onset of symptoms will take place in late childhood or adolescence. Mobility will diminish over the years but usually still be present in advanced years. No valid data on life expectancy. Overall benign course.

In Ullrich myopathy, muscle weakness and muscular contractures are noticed at birth or in early infancy. Neonates may present with congenital hip dislocation and general hypotonia whilst infants may present with difficulty climbing stairs. Even where independent ambulation is achieved in childhood, most will be wheelchair-bound from early adolescence. Affection of respiratory muscles is frequent and ventilation support may be necessary intermittently (nocturnal) or permanently. The clinical course may be complicated by recurrent pulmonary infections. The phenotype will be characterized by hypermobility of peripheral joints and contractures of proximal joints as well as scoliosis and kyphosis. Affected individuals may present with a round facies with long thin limbs and muscular wasting. Muscular weakness may also prevent adequate mastication and may lead to underweight.

Impaired Collagen VI function can also lead to follicular hyperkeratosis resulting in impaired wound healing and keloid scar formation.

Collagen VI is not found in the CNS and thus cognitive ability is unaffected. There is no sensory component. Cardiac function seems to be normal in Ullrich disease. Data for Bethlem myopathy is conflicting with isolated reports of mild cardiomyopathy and a unclear relevance for anaesthesia practice [5]. Serum creatine kinase may be slightly raised as a biochemical marker.

Typical surgery

Surgical correction of musculoskeletal, especially spinal deformities – e.g. scoliosis correction [6]. Distraction osteotomy - growth rod insertion. Contracture release.

Tracheostomy, Gastrostomy and pressure ulcer repair in the most severe cases.

Scar revision surgery.

Type of anaesthesia

There is no data to indicate the superiority of either intravenous or volatile anaesthetics [7]. Literature and pathophysiology suggest no connection to malignant hyperthermia. Depolarizing muscle-relaxants should however be avoided in the context of patient immobilisation.

Little information is available in literature regarding neuro-axial blockade and regional anaesthesia in these patients. The presence of a scoliosis and/ or kyphosis can present a significant technical challenge. Regional anaesthesia may be beneficial in patients with impaired respiratory capacities but also present with severe challenges due to contractures and difficulties in positioning and anatomical access. Be aware that some reports indicate that minimal tissue injury can cause severe subcutaneous haemorrhage.

Necessary additional diagnostic procedures (preoperative)

Respiratory function needs to be robustly assessed prior to the administration of general anaesthesia. Even more than a chest X-ray, lung function tests should be performed to assess respiratory impairment. This includes an arterial blood gas analysis.

Although cardiac function seems unaffected by the disease per se, there may be evidence of right heart failure as a consequence of prolonged respiratory involvement and therefore an ECG and an Echocardiogram is advisable, if right heart involvement is suspected. The significance of single reports of very mild and clinically irrelevant cardiomyopathy in Bethlem myopathy is not yet clear.

Blood analysis may highlight polycythaemia (respiratory impairment) or concurrent (airway/pulmonary) infection. Urea, creatinine and electrolytes will help to rule out any renal end organ damage as a result of the pre-existing scoliosis and is helpful to refer to following surgery in the prone position.

Particular preparation for airway management

In cases accompanied by the typical facial stigmata, micrognathia and a high arched palate can lead to difficult intubation conditions. Preparations for difficult airway management are advisable.

Particular preparation for transfusion or administration of blood products

Literature does not indicate any increased requirements resulting from the myopathy per se. However, corrective spinal and extensive musculoskeletal surgeries have inherent procedural risks of major blood loss.

Particular preparation for anticoagulation

No information on specific disease related pathophysiology. As mentioned above: Remember the procedural risks of major musculoskeletal/spinal surgery.

Particular precautions for positioning, transport or mobilisation

Previous immobilisation, contractures and underweight may be marked and careful patient positioning is crucial in order to avoid pressure ulcers and nerve entrapment syndromes.

This condition is associated with respiratory insufficiency and whilst the prone position (for spinal surgery) can be helpful with gas exchange, extra care should be taken for adequate positioning.

Ullrich myopathy is associated with follicular hyperkeratosis which leads to keloid scar formation, impaired wound healing and increased skin and soft tissue vulnerability. Extra caution is advisable with bandages, eye pads and other adhesives.

Probable interaction between anaesthetic agents and patient's long-term medication

Children with Ullrich disease may be on prophylactic antibiotics, which may alter the choice of antibiotics used for surgical prophylaxis.

Cyclosporine A may be of benefit in Ullrich disease and children on this drug may display its side effects including gingival hyperplasia and hypertension.

Anaesthesiologic procedure

Inhalational and TIVA techniques may both be used. Little evidence surrounds the use of neuro-axial anaesthesia and regional anaesthesia. Invasive procedures may lead to significant cutaneous and subcutaneous bleeding.

Particular or additional monitoring

Invasive arterial catheters seem useful to assess ventilation and gas exchange both during surgery and in the post-operative period.

In Cases of pulmonary hypertension and/or right ventricular dysfunction, advanced hemodynamic monitoring (Swan-Ganz-catheter, Intra-operative-TEE) should be considered.

Possible complications

Skins lesions and reactions may be seen as a result of the use of dressings, eye tapes and ECG pads.

Pressure ulcers may develop due any difficulty with the positioning of patients.

Postoperative care

In severe cases (typically Ullrich myopathy) respiratory failure may complicate the postoperative course. Those patients should be handled in an intensive care or high-dependency environment.

Information about emergency-like situations / Differential diagnostics

caused by the illness to give a tool to distinguish between a side effect of the anaesthetic procedure and a manifestation of the disease

Iatrogenic causes of respiratory failure should be avoided including the overuse of opiate analgesia, prolonged action of neuromuscular blocking drugs, hypothermia and residual anaesthetic agents.

Ambulatory anaesthesia

Due to the complex and rare nature of this disorder and the risk of possible postoperative respiratory failure in severely affected patients, ambulatory anaesthesia should only be considered in the mildest of phenotypes.

Obstetrical anaesthesia

Literature does not provide any data regarding parturient patients with Collagen VI myopathies. Neuro-axial procedures may be complicated by anatomical difficulties and skin/soft tissue vulnerability (haemorrhage!).

Literature and internet links

References

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Internet links

CURE CMD *(Support group based in the USA; content in English; containing links to further online resources for non-physicians in social media)*: http://curecmd.org

MUSCULAR DYSTROPHY UK *(Charity based in the UK; content in English; umbrella organisation for over different conditions of muscular dystrophy)*: http://www.musculardystrophyuk.org/

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