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MYH9-related disease (MYH9-RD)

Neuromyotonia

orphanaesthesia

a project of the German Society
of Anaesthesiology and Intensive Care Medicine

SUPPLEMENT NR. 8 | 2023

OrphanAnesthesia –
ein krankheitsübergreifendes Projekt des Wissenschaftlichen Arbeitskreises Kinderanästhesie der Deutschen Gesellschaft für Anästhesiologie und Intensivmedizin e.V.

Ziel des Projektes ist die Veröffentlichung von Handlungsempfehlungen zur anästhesiologischen Betreuung von Patientinnen und Patienten mit seltenen Erkrankungen. Damit will OrphanAnesthesia einen wichtigen Beitrag zur Erhöhung der Patientensicherheit leisten.

Patientinnen und Patienten mit seltenen Erkrankungen benötigen für verschiedene diagnostische oder therapeutische Prozeduren eine anästhesiologische Betreuung, die mit einem erhöhten Risiko für anästhesieassoziierte Komplikationen einhergehen. Weil diese Erkrankungen selten auftreten, können Anästhesistinnen und Anästhesisten damit keine Erfahrungen gesammelt haben, sodass für die Planung der Narkose die Einholung weiterer Information unerlässlich ist. Durch vorhandene spezifische Informationen kann die Inzidenz von mit der Narkose assoziierten Komplikationen gesenkt werden. Zur Verfügung stehendes Wissen schafft Sicherheit im Prozess der Patientenversorgung.

Die Handlungsempfehlungen von OrphanAnesthesia sind standardisiert und durchlaufen nach ihrer Erstellung einen Peer-Review-Prozess, an dem eine Anästhesistin bzw. ein Anästhesist sowie eine weitere Krankheitsexpertin bzw. ein weiterer Krankheitsexperte (z. B. Pädiaterin bzw. Pädiater oder Neurologin bzw. Neurologe) beteiligt sind. Das Projekt ist international ausgerichtet, sodass die Handlungsempfehlungen grundsätzlich in englischer Sprache veröffentlicht werden.

Ab Heft 5/2014 werden im monatlichen Rhythmus je zwei Handlungsempfehlungen als Supplement der A&I unter www.ai-online.info veröffentlicht. Als Bestandteil der A&I sind die Handlungsempfehlungen damit auch zitierfähig. Sonderdrucke können gegen Entgelt bestellt werden.

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OrphanAnesthesia –
a project of the Scientific Working Group of Paediatric Anaesthesia of the German Society of Anaesthesiology and Intensive Care Medicine

The target of OrphanAnesthesia is the publication of anaesthesia recommendations for patients suffering from rare diseases in order to improve patients' safety. When it comes to the management of patients with rare diseases, there are only sparse evidence-based facts and even far less knowledge in the anaesthetic outcome. OrphanAnesthesia would like to merge this knowledge based on scientific publications and proven experience of specialists making it available for physicians worldwide free of charge.

All OrphanAnesthesia recommendations are standardized and need to pass a peer review process. They are being reviewed by at least one anaesthesiologist and another disease expert (e.g. paediatrician or neurologist) involved in the treatment of this group of patients.

The project OrphanAnesthesia is internationally oriented. Thus all recommendations will be published in English.

Starting with issue 5/2014, we'll publish the OrphanAnesthesia recommenations as a monthly supplement of A&I (Anästhesiologie & Intensivmedizin). Thus they can be accessed and downloaded via www.ai-online.info. As being part of the journal, the recommendations will be quotable. Reprints can be ordered for payment.

Find a survey of the recommendations published until now on:

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orphananesthesia

Anaesthesia recommendations for

Neuromyotonia

Disease name: Neuromyotonia

ICD 10: G71.19

Synonyms: Isaac's syndrome, Continuous muscle fibre activity syndrome, Isaacs-Mertens syndrome, Quantal-Squander syndrome, Gamstorp-Wohlfar syndrome, pseudomyotonia

Disease summary: Neuromyotonia is a rare condition (prevalence of less than 1 in 1,000,000) of peripheral nerve hyperexcitability. There is a hereditary form through an autosomal dominant mutation of the KCNA1 gene on chromosome 12p13. This form commonly features tachycardia, excessive sweating and it is sometimes associated with a congenital diaphragmatic hernia. There is also an autosomal recessive form of the disease involving the HINT1 gene.

There is also an acquired form in which most patients have autoantibodies to Caspr2 and LGI1, which are proteins associated with the presynaptic voltage gated potassium channel (VGKC). This causes a hyperexcitability of the nerve membranes. These autoantibodies are either of autoimmune origin (association with myasthenia, Hashimoto's thyroiditis or pernicious anaemia) or a paraneoplastic syndrome (thymoma, lung, ovarian or bladder cancer, Hodgkin's lymphoma).

Neuromyotonia typically presents with myokymia (muscle twitching), stiffness (30 % present with pseudomyotonia, manifesting as delayed relaxation following muscle contraction) and muscle cramps. Less common manifestations may include easy fatigability, hyperhidrosis and ataxia. Onset of disease can happen at any age and is sometimes associated with myasthenia gravis and thymoma as noted above. It can follow either a progressive course or a relapsing/remitting pattern. Diagnosis is made by a combination of clinical symptoms such as myokymia in the presence of electromyography (EMG) showing doublets/triplets discharges. Other imaging such as computerised tomography or MRI may be utilised to investigate the presence of thymoma or other malignancies associated with the paraneoplastic form of neuromyotonia. Treatment with anticonvulsants, such as phenytoin, carbamazepine or gabapentin is common to relieve some of the pain associated with the abnormal muscle firing. Plasma exchange, IVIG (intravenous immunoglobulin) and steroids have been reported to alleviate symptoms in some patients. The presence of a malignancy may require surgical work up and intervention in affected patients.

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Medicine is in progress

Perhaps new knowledge

Every patient is unique

Perhaps the diagnosis is wrong

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

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Typical surgery

Typical age of onset is from 15–40 years of age. Therefore, surgeries will be the same as the most common procedures in this age group (orthopaedic, cosmetic, etc.). If the disease presents as a paraneoplastic syndrome, tumour biopsies and resections might also be performed [1].

Type of anaesthesia

Total intravenous anaesthesia and peripheral anaesthesia are the only reported modalities due to the small suggested risk of malignant hyperthermia as discussed below in the anaesthetic procedure section. The use of both techniques has been reported without anaesthetic complication [1,2]. Avoidance of succinylcholine is also recommended not only due to the suggested risk of malignant hyperthermia but mainly due to the risk of an exaggerated hyperkalaemic response in patients with myopathies [3].

Necessary additional pre-operative testing (beside standard care)

Aside from clinically indicated testing (for example, related to an associated cancer or autoimmune disease), there is no specific testing that needs to be completed before anaesthesia. CPK levels are usually moderately increased.

Particular preparation for airway management

Previous reports have commented on myokymia, specifically in the laryngeal and bulbar muscles as a risk factor for aspiration. Some have recommended stomach acid prophylaxis due to this risk. This muscle hyperexcitability normally stops with induction of anaesthesia, which could decrease the risk for any further aspiration event [4,5].

Particular preparation for transfusion or administration of blood products

Not reported.

Particular preparation for anticoagulation

Not reported. However, some medications (phenytoin and carbamazepine) used in the treatment of this condition are CYP3A4 inducers, which may interfere with chronic anticoagulation medications such as warfarin [6].

Particular precautions for positioning, transportation and mobilisation

Not reported.

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Interactions of chronic disease and anaesthesia medications

Some of the medications utilised in the chronic management of neuromyotonia have interactions with medications used in the operating room. The most significant of these are phenytoin and carbamazepine which are CYP3A4 inducers [6]. These have the potential to decrease plasma levels of beta-blockers and some antibiotics. Other treatments, such as plasma exchange prior to operations, have a limited effect on anaesthetic agents, except if performed the day before anaesthesia (consider the risk of hypoproteinaemia) [7].

The medical treatment for an associated cancer or autoimmune disease should also be taken into account.

Anaesthetic procedure

Propofol, opiates, local anaesthetics, midazolam and anti-nausea prophylaxis (ondansetron and dexamethasone) have been used without any adverse events [1,2,4,5].

A risk of malignant hyperthermia with inhalational agents as well as succinlycholine, has been alluded to in some reports. However, neuromyotonia is characterised by a defect in the presynaptic voltage-gated potassium channel (VGKA). Malignant hyperthermia is most commonly caused by a defect in the ryanodine receptor (RYR1) or, more rarely, by mutations in the CACNA1S or STAC3 receptors, which are both associated with proteins in the T-tubule in calcium signalling [8]. This leads to a drastic increase in myoplasmic calcium. Therefore, the risk of malignant hyperthermia should not be greater in patients with neuromyotonia than in the normal population. Nevertheless, due to a paucity of anaesthetic data and despite the absence of any report of any anaesthesia-induced rhabdomyolysis with this rare condition, it may be prudent to avoid inhalational agents when an alternative is available.

Particular or additional monitoring

Intermittent or continuous train-of-four (TOF) monitoring is helpful to titrate the dosage of the non-depolarising muscle relaxant, optimise surgical conditions and stop myokymia. The patient may indeed be sensitive or resistant to the non-depolarising muscle relaxants depending, for example, on whether the disease is associated with myasthenia gravis or on the time elapsed since the last plasmapheresis.

Possible complications

The most common complications will be related to painful postoperative myokymia. There is also a risk for a prolonged neuromuscular blockade in patients that have concurrent myasthenia gravis. Myokymia may lead to suboptimal surgical conditions and increase the risk of damage to surrounding structures during surgery. However, myokymia ceases in all reported cases with neuromuscular blockade. Other reports note that there is the potential for an increased risk of aspiration due to an involvement of laryngeal muscles, but no cases have been published so far.

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Postoperative care

Case reports have reported of extended stays in hospital. This happened in one case due to painful myokymia, which necessitated a prolonged stay for pain control after surgery [4,9].

Disease-related acute problems and effect on anaesthesia and recovery

As above.

Ambulatory anaesthesia

There are some reports of neuromyotonia patients being discharged the next day [1] or even the same day [10]. However, some patients have required prolonged stays for postoperative complications [4,9].

Obstetrical anaesthesia

There are no current published reports on obstetrical anaesthesia in neuromyotonic parturient. However, there is no reason to expect that epidural or spinal anaesthesia could not be used, as spinal anaesthesia has been used in other conditions with myokymia leading to the cessation of these abnormal muscle discharges [11].

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