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Larsen syndrome

Methylmalonic acidemia (or aciduria)

orphanaesthesia

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

SUPPLEMENT NR. 7 | 2022

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 Patienten mit seltenen Erkrankungen. Damit will Orphan Anesthesia einen wichtigen Beitrag zur Erhöhung der Patientensicherheit leisten.

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 Anästhesisten damit keine Erfahrungen gesammelt haben, so dass 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 ein Anästhesist sowie ein weiterer Krankheitsexperte (z.B. Pädiater oder Neurologe) beteiligt sind. Das Projekt ist international ausgerichtet, so dass 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.

Bisher in A&I publizierte Handlungsempfehlungen finden Sie unter:

www.ai-online.info/Orphsuppl
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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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orphanaesthesia

Anaesthesia recommendations for

Larsen syndrome

Disease name: Larsen syndrome

ICD 10: Q74.8
OMIM: 150250

Synonyms: -

Disease summary: First described in 1950, Larsen syndrome (LS) is a rare hereditary condition, characterised by multiple joint dislocations and characteristic facial, hand and feet abnormalities. Both autosomal dominant and recessive forms exist, although the former is much more common. The incidence of the disease is 1:100,000, with equal gender distribution. The autosomal dominant form of the disease is caused by mutations of the gene encoding filamin B, in a region containing human type VII collagen. This leads to abnormal collagen fibre formation, resulting in musculoskeletal and cardiac anomalies. The vertebrae are affected, causing cervical spine instability and kyphoscoliosis. Joints are prone to dislocation. Cardiac abnormalities can exist. Respiratory abnormalities occur due to a decreased rigidity of cartilages in the airway and rib cage, leading to laryngotracheomalacia, bronchomalacia and lung hypoplasia. Repeated surgical interventions for spinal and musculoskeletal abnormalities are common, warranting careful anaesthetic evaluation of the airway, cervical spine, cardiovascular, respiratory and neurological function. Despite the multisystem organ involvement, patients can have productive lives with early corrective surgery and support.

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

Talipes correction and craniofacial surgery are typically performed in early life. As the bones grow, these patients may require repeated orthopaedic surgeries to correct skeletal dislocations or deformities. Spinal surgery such as cervical spine fusion and scoliosis correction are also common. Multiple revisions of spinal fusions may be required due to the progression of the deformity.

Type of anaesthesia

General and regional anaesthesia can be used, although the disease involvement of the spine makes the latter technically challenging. Both intravenous and gas induction are safe. While there was one case report of malignant hyperthermia due to volatile agents, the evidence for this association was strongly disputed in the same journal. There is no contraindication to common anaesthetic drugs. Only in rare cases of distal muscle weakness due to cervical myelopathy should depolarising agents be avoided, due to the risk of causing hyperkalaemia. Regional analgesia such as caudal blocks have been described [38].

Necessary additional pre-operative testing (beside standard care)

Additional tests are guided by a thorough assessment of the airway, cervical spine, and respiratory, cardiovascular, neurological and musculoskeletal systems.

A thorough evaluation of the airway is necessary in these children. In clinically asymptomatic patients, indirect laryngoscopy will give a fair idea of the airway. Nasal fibre-optic endoscopy should be requested by ENT surgeons in uncooperative and symptomatic children to assess airway dynamics and to rule out the presence of laryngotracheomalacia and subglottic stenosis.

Because of the frequent involvement of the cervical spine, it is recommended to do a cervical X-ray as a bare minimum investigation in all cases of LS. Cervical spine imaging, such as CT or MRI, should be done if there are positive findings in the X-ray of the cervical spine or in the presence of neurological signs.

A pre-operative electrocardiogram should be considered. If a murmur is elicited on auscultation, cardiology review will be required and an echocardiogram may be necessary.

Pulmonary function tests may reveal a restrictive picture if kyphosis is significant.

Particular preparation for airway management

Difficult intubation should always be anticipated. Equipment such as paediatric bougies, supraglottic airway devices, video laryngoscopes and fibre-optic endoscopes should be available. Previous anaesthetic charts should be reviewed due to the likelihood of repeated surgeries.

Manual in-line stabilisation of the cervical spine is recommended even in the absence of neurological signs pre-operatively.

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Particular preparation for transfusion or administration of blood products

No special requirements for transfusion have been reported. Blood loss should be anticipated in complex and prolonged orthopaedic procedures.

Particular preparation for anticoagulation

There is no known association between LS and coagulopathy.

Particular precautions for positioning, transportation and mobilisation

Careful positioning of patients with LS is extremely important. The cervical spine needs to be handled with care, especially during prone positioning for vertebral surgery. Large joints are at risk of dislocations and need to be positioned carefully.

Interactions of chronic disease and anaesthesia medications

Not reported.

Anaesthetic procedure

Premedication is generally safe. Both intravenous or gas induction can be used. Once asleep, cervical in-line stabilisation should be maintained and difficult airway anticipated. Because of the common presence of laryngotracheomalacia, it may be safe to use muscle relaxants only after confirming adequate bag mask ventilation. Common anaesthetic agents are safe to use. Additional monitoring may be required depending on type and duration of the procedures. Positioning or transfer of patient need to be done carefully to minimise risk of dislocations. Extubation requires careful planning due to the high incidence of airway oedema and laryngotracheomalacia.

Particular or additional monitoring

For surgery involving the spine, intraoperative neurophysiological monitoring may be required, such as somatosensory or motor evoked potentials in order to minimise the risk of spinal cord damage during surgery.

Invasive monitoring should be considered if the patient has severe cardiac involvement.

Careful monitoring of patient positioning during prolonged procedures would help to reduce the risk of musculoskeletal injury.

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Possible complications

Complications arise mainly from known risks. Cervical injury due to excessive neck manipulation can occur, particularly if tracheal intubation is difficult. There have been numerous reports on respiratory complications after surgery. Post-extubation airway oedema may cause croup/stridor. The presence of laryngotracheomalacia or subglottic stenosis may further contribute to respiratory complications in the post-operative period. Bronchomalacia and lung hypoplasia may contribute to respiratory failure during the post-operative period. Musculoskeletal injury can occur due to suboptimal positioning.

There was one case report of intraoperative cardiac arrest during spinal surgery under sevoflurane anaesthesia. This was attributed to a combination of a known pre-existing cardiac disease and stress of scoliosis surgery.

Post-operative care

High dependency or intensive care unit admission should be considered if the patient's disease reveals a significant organ involvement, or if the surgical procedure is prolonged and complicated. Patients with severe kyphoscoliosis may require additional respiratory support after extubation.

Disease-related acute problems and effect on anaesthesia and recovery

There are no known complications reported in the literature.

Ambulatory anaesthesia

There are no reported day case procedures in the literature. However, this can be considered depending on the pre-operative condition of the patient and type of surgery.

Obstetrical anaesthesia

Due to pelvic and hip abnormalities in LS, planned caesarean sections are preferred.

General anaesthesia is best avoided. Pregnancy-induced changes to the airway and respiratory system would compound the problems in Larsen syndrome. However, spinal or epidural insertions would be technically challenging due to vertebral abnormalities. Time permitting, a regional technique consisting of an epidural catheter with gradual titration of the local anaesthetic will be ideal. This reduces an excessive rostral spread, and minimises the risk of respiratory complications. Difficult airway equipment should be prepared in case a general anaesthetic is required.

Neonatal cervical spine protection during delivery may be required if pre-natal screening reveals a likelihood of a baby having LS.

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Attachment 1

Table 1: Summary of anaesthetic considerations in Larsen syndrome

System	Anaesthetic considerations
Airway	Anticipate difficult airway Obtain imaging for cervical spine Maintain manual in-line cervical stabilisation during intubation Care with extubation
Respiratory	Potential complications due to tracheo-bronchomalacia and lung hypoplasia. Close monitoring post-operatively
Cardiovascular	Investigate for possible underlying cardiac disease Obtain ECG, consider cardiology review and transthoracic echocardiogram
Neurological	Meticulous handling of the cervical spine throughout the case to reduce the risk of spinal cord injury
Musculoskeletal	Exercise care with transfer and positioning, especially large joints

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