orphananesthesia

Anaesthesia recommendations for patients suffering from

3-M syndrome

Disease name: 3-M syndrome

ICD 10: Q87.1

Synonyms: Dolichospondylic dysplasia, 3M dwarfism, gloomy face syndrome, Le Merrer syndrome

3-M syndrome is a recessive autosomal genetic growth disorder, characterized by significant pre- and postnatal growth retardation. It is listed as a rare or an “orphan” disease having a prevalence in Europe of less than 1 person per 2000 in the general population or affecting less than 200000 people in the US population, with fewer than 100 patients having been reported in the medical literature since 1975.

The name of the disease originates from the initials of the three authors, Miller, McKusick and Malvaux, who first reported the syndrome in the literature. The disease is caused by mutations in Cullin 7 (CUL7) gene on chromosome 6p21.1, in most cases, or in the Obscurin-like 1 (OBSL1) gene on chromosome 2q35-36.1 encoding a cytoskeletal adaptor protein. A third gene has recently been identified, encoding the Coiled coil domain containing protein 8 (CCDC8), on chromosome 19q13.32.

Medicine in progress

Perhaps new knowledge

Every patient is unique

Perhaps the diagnostic is wrong

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Disease summary

3-M syndrome is characterised by proportional but severely delayed growth, a process that begins in uterus. It results in an adult height of 115-150cm. Pre- and postnatal retardation is accompanied by specific facial and skeletal features and normal intelligence.

Craniofacial characteristics are: a triangular face, full eyebrows, a hypoplastic midface, a fleshy nose tip, upturned nares, long philtrum with a prominent mouth and lips and pointed chin. Head circumference often remains within the normal range, and in association with the prominent forehead, the impression of a disproportionately large head in comparison to body size is given.

Skeletal anomalies consist of prominent trapezii, short broad neck, deformed sternum, short thorax, square shoulders, winged scapulae, short 5th fingers, prominent heels, hyperlordosis and loose joints (dislocated hips). Spina bifida occulta is sometimes present at the lumbosacral level. The vertebral bodies are usually tall and foreshortened; the long bones are cylindrical with thin diaphyses. The pelvis is small with small iliac wings.

A specific indication for surgery is bone lengthening. Medical treatment with growth hormone, although usually administered does not seem to be efficient. Hypergonadotropic hypogonadism is present in boys.

There are only two bibliographic references of anaesthesia in patients with 3-M syndrome. The anaesthetic assessment and management of a 6-year-old boy undergoing inguinal hernia repair suggested no evidence of anaesthetic implications of the syndrome during childhood. However, the case of a young, pregnant female with 3-M syndrome undergoing caesarean section, revealed airway management difficulties, caused by the anatomical features of the syndrome, the pregnancy or a combination of both.

Typical surgery

Orthopaedic operations especially bone lengthening of the lower limbs: it is safer to perform each side at a few weeks of interval because bilateral surgery on the same day involves a major risk of fatal fat embolism syndrome.

Dental and hypospadias surgery are also sometimes needed.

Type of anaesthesia

No definite recommendation regarding either general or regional anaesthesia can be made. The disease does not affect the respiratory, cardiac, endocrine or neuromuscular system. Moreover, the genetic manifestation of the disorder precludes an effect on the metabolism of the anaesthetic drugs, which would support the use of inhalational or intravenous anaesthesia.

Anatomical features, such as short vertebral column and kyphoscoliosis may evoke difficulties in performing perimedullar regional anaesthesia techniques. Even in the absence of kyphoscoliosis, the presence of spinal bifida occulta should be excluded if a neuraxial block is foreseen.

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Necessary additional diagnostic procedures (preoperative)

As indicated by the patient's history and type of surgery.

A lumbar X-ray or an MRI of the lumbar spine are useful to exclude the presence of a spina bifida occulta if a perimedullar block is planned.

Particular preparation for airway management

Due to the rarity of reported anaesthetic cases (only one case of a pregnant patient with a difficult airway) there is lack of sufficient data. By analogy with other diseases of delayed development with short stature, the size of the endotracheal tube should probably approximated using patient's weight rather than age.

The syndrome may be associated with difficult intubation in adulthood due to the progression of the skeletal and facial abnormalities. The short neck, midface and maxillary hypoplasia, prominent mouth etc may accentuate laryngoscopy and intubation difficulties. Specific equipment for management of difficult airway should thus be available, such as LMA, bougie, a Glidescope, an Airtaq or a fiberoptic bronchoscope. If neuromuscular blocking agents such as vecuronium or rocuronium are administered for intubation, sugammadex should be available.

Particular preparation for transfusion or administration of blood products

Nothing indicated.

Particular preparation for anticoagulation

Nothing indicated.

Particular precautions for positioning, transport or mobilisation

Nothing indicated.

Probable interaction between anaesthetic agents and patient’s long term medication

Some children are on chronic treatment with growth hormone (GH), aiming at an improvement of their height. GH has no interactions with anaesthetic agents. Chronic treatment in children results in a relative insulin resistance and follow-up of these children is required for the developement of diabetes mellitus type II. Furthermore, GH treatment during childhood does not seem to increase the risk of hypertension and seems to have a beneficial effect on lipid metabolism in children, decreasing the atherogenic index at least up to six years. Additional research into adulthood is required because of the reported higher risk of cardiovascular disease in later life in children treated with GH.

Anaesthesiologic procedure

No specific recommendations need to be made regarding the intraoperative period. It is only the possibility of the difficulty in intubation that may determine the anaesthetic management.

Particular or additional monitoring

Monitoring of the neuromuscular blockade is recommended, particularly for patients with airway management difficulties.

Possible complications

Nothing indicated.

Postoperative care

As indicated from the surgical procedure and the perioperative events.

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

Nothing indicated.

Ambulatory anaesthesia

Children have no expected airway management problems and, therefore, are suitable candidates for ambulatory anaesthesia.

Obstetrical anaesthesia

Intubation difficulties may be accentuated by pregnancy.

Literature and internet links

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Last date of modification: December 2013

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