Aktiv Druck & Verlag GmbH | ISSN 0170 - 5334 I 02330

www.ai-online.info

60. Jahrgang | Februar 2019

A&I

ANÄSTHESIOLOGIE & INTENSIVMEDIZIN

Offizielles Organ: Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin e.V. (DGAI)
Berufsverband Deutscher Anästhesisten e.V. (BDA)
Deutsche Akademie für Anästhesiologische Fortbildung e.V. (DAAF)
Organ: Deutsche Interdisziplinäre Vereinigung für Intensiv- und Notfallmedizin e.V. (DIVI)

Timothy syndrome

Tracheal agenesis

orphanaesthesia

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

SUPPLEMENT NR. 2 | 2019

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
www.orphananesthesia.eu

OrphanAnesthesia –
a common 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.

A survey of until now in A&I published guidelines can be found on:

www.ai-online.info/Orphsuppl
www.orphananesthesia.eu

Projektleitung
Prof. Dr. Tino Münster, MHBA
Chefarzt
Klinik für Anästhesie und operative Intensivmedizin
Krankenhaus Barmherzige Brüder Regensburg
Prüfeninger Straße 86
93049 Regensburg,
Deutschland
Tel.: 0941 369-2350
E-Mail: Tino.Muenster@barmherzige-regensburg.de

DGAI
Deutsche Gesellschaft für Anästhesiologie & Intensivmedizin
www.dgai.de

A&I
ANÄSTHESIOLOGIE & INTENSIVMEDIZIN
www.ai-online.info

orphananesthesia

Anaesthesia recommendations for patients suffering from

Timothy Syndrome

Disease name: Timothy Syndrome

ICD 10: I45.8

Synonyms: LQT8, Long QT syndrome type 8, Long QT syndrome-syndactyly syndrome

Timothy Syndrome is one of the many syndromes causing long QT and is referred to as 'Long QT Syndrome Type 8'. It was first described by Timothy et al in 2004 and is a rare genetic disorder.

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

▶ **Citation:** Francis J, Yates D: Timothy Syndrome. Anästh Intensivmed 2019;60:S18–S26.
DOI: 10.19224/ai2019.S018

Disease summary

It has a broad spectrum of characteristics which include:

- cardiac arrhythmias (prolonged QT/QTc interval, bradycardia, 2:1 AV block, T-wave alternans)
- congenital cardiac defects (PDA, PFO, VSD, Tetralogy of Fallot, HOCM)
- syndactaly (variably involving the index, middle, ring and little fingers)
- bilateral cutaneous syndactaly of the second and third toes

The following features have also been described:

- craniofacial characteristics
- immunodeficiency
- neurodevelopment delay
- a tendency to hypoglycaemia
- autistic spectrum disorders

Two forms of Timothy Syndrome exist. Type 1 includes all of the characteristic features. Type 2 causes a more severe form of long QT syndrome (LQTS) but does not appear to cause the fusion of interdigital skin.

All cases of Timothy Syndrome arise from a mutation if the CACNA1C gene which is located on the short arm of Chromosome 12. This gene encodes the L-type Ca(v)1.2 calcium channel protein. The gene mutation causes a reduction in the inactivation of the calcium channels during the plateau phase of the cardiac action potential. The result is that the calcium channels never close properly allowing excess calcium to influx into the cell. This in turn leads to prolongation of the plateau phase and thus the QT/QTc interval. The clinical implications of this are: an increased risk of spontaneous ventricular tachyarrhythmia, especially Tornadoes de points (TdP), and sudden death.

A recent study identified five variants in the CACNA1C gene associated with long QT syndrome, however not all were associated with the phenotypical manifestations of Timothy Syndrome. Timothy Syndrome is inherited in an autosomal dominant manner, however most cases arise as spontaneous mutations rather than from direct parental inheritance.

Tachyarrhythmia is the leading cause of death, followed by infection and complications of intractable hypoglycaemia. The life expectancy of a patient with Timothy Syndrome is 2.5 years, however as may patients live for much longer, anaesthetists may need to provide anaesthesia to patients of a variety of ages with Timothy Syndrome.

Typical surgery

Typical surgeries performed on patients with Timothy Syndrome are: corrective cardiac surgery, insertion of implantable automated defibrillator or pacemaker, plastic surgery for the correction of syndactaly.

Type of anaesthesia

Given the patient cohort and likely nature of the surgeries, anaesthesia would involve a general anaesthetic with the possible addition of central or regional neuroblockade.

Necessary additional diagnostic procedures (preoperative)

Pre-operative planning is of paramount importance and should involve a multidisciplinary team comprising the relevant paediatric surgeon, anaesthesiologist and paediatric cardiologist.

Pre-operative evaluation must include an ECG. Whilst the calculation of the resting heart rate, QTc interval and recognition of other electrical abnormalities is essential, no recommendations are published regarding the specific cut-offs which may contraindicate surgery. Ambulatory ECG monitoring can be considered to identify the presence, frequency and duration of paroxysmal arrhythmic episodes.

Patients with Timothy Syndrome may exhibit a variety of ECG changes as described above. As the QT interval varies with heart rate the QTc is calculated using Bazette's equation:

$$QTC = QT/\sqrt{RR}$$

The QT interval is usually measured in lead II as the T-wave end is usually discrete and the QT interval itself has good correlation with the maximal QT measurement across the entire 12 lead ECG.

T-wave alternans is a pathognomonic feature of LQTS. However, this beat to beat variation in T-wave amplitude has high specificity but very low sensitivity for LQTS.

Echocardiography should be performed to identify previously undiagnosed congenital structural cardiac defects and to assess cardiac function.

Serum electrolytes, especially potassium, magnesium and calcium, should be measured and corrected. Low levels of these electrolytes predispose to delayed ventricular depolarisation and therefore prolongation of the QT interval.

Patients with proven LQTS require pre-operative treatment, beta blockade is the usual form of pharmacological intervention. Beta blockers maintain QT interval stability and suppress cardiac sympathetic stimulation. Beta blockers should be continued up to and including the morning of surgery. The acute use and effectiveness of beta blocker therapy during and acute arrhythmic crisis during surgery is currently unknown.

Any pacemaker of implanted internal defibrillator must be checked preoperatively and surgical teams must consider the effect diathermy may have on the device.

As with any anaesthetic candidate, a thorough respiratory history and examination should be performed. In addition to assessing for respiratory sequelae of cardiac function abnormalities, signs of intercurrent infection must be looked for as this may influence the preoperative course.

Particular preparation for airway management

There are no specific prerequisites for the airway management other than to ensure that the patient is adequately anaesthetized and analgesed prior to airway manipulation to prevent sympathetic surges precipitating tachyarrthmias.

Given the likely age group of patients with Timothy syndrome, the anaesthesist should be familiar with the management of the paediatric airway.

Particular preparation for transfusion or administration of blood products

There are no specific recommendations regarding the administration of blood products. The maintenance of tissue oxygen delivery should be considered especially with co-existing congenital cardiac co-morbidities.

Particular preparation for anticoagulation

There is no prerequisite for anticoagulation for Timothy Syndrome itself. No coagulopathies have been described. However, there may be indications for anticoagulation specific to congenital cardiac abnormalities and their subsequent correction.

Particular precautions for positioning, transport or mobilisation

There are no specific precautions for the mobilisation and positioning of patients with Timothy syndrome.

The transportation of the anaesthetized patient with Timothy Syndrome should be performed with the same care as with any anaesthetized patient with full, continuous, invasive monitoring and easy access to emergency resuscitation drugs and equipment. Particular attention must be paid to ensuring an adequate depth of anaesthesia, gentle handing and maintaining a temperature controlled environment.

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

During surgery, drugs known to increase the QTc and induce TdP should be avoided. The list potential drugs is long a resource providing an up to date list of medications should be regularly consulted, e.g. www.qtdrugs.org

Anaesthesiologic procedure

Precautions should begin during the immediate pre-operative period and should focus on minimizing the stress associated with the impeding surgery. The patient should be kept in a warm, quiet and supportive environment. The application of topical local anaesthetic creams to potential venipuncture sites is advised. There is also a suggestion that sedation prior to venepuncture and cannulation should be considered as the act of venipuncture has been documented to induce arrhythmias.

Adequate sedation and analgesia reduces catecholamine release. Midazolam is considered an appropriate drug for providing sedation as it has no effect on the QTc in healthy adults. Midazolam reduces sympathetic activity in unstimulated patients; however, it does not blunt the haemodynamic response to oral or nasal intubation. Fentanyl and morphine are commonly used analgesics and, whilst the effects of fentanyl on the QTc are conflicting, fentanyl and morphine have been used in patients with congenital LQTS without any adverse effects.

Some literature has advocated the administration of magnesium sulphate prophylactically, even in the presence of normal serum magnesium levels.

Positive pressure ventilation strategies should ensure that sustained high intra thoracic pressures are avoided as this mimics a vaslaslva manoeuvre, which can lengthen QT intervals in patients who are not fully beta blocked.

Induction agents:
Induction of anaesthesia can be performed using either halogenated volatile anaesthetics or with intravenous agents. Many anaesthetic drugs are known to prolong the QTc, nevertheless all anaesthetic agents have been successfully used. Halothane, enflurane, isoflurane, desflurane and sevoflurane all prolong the QTc, even if the data available for some of these agents is controversial. Propofol infusion is an alternative to inhaled anaesthetic gases for the maintenance of anaesthesia and is a drug with which most anaesthesiologists are very familiar.

Ketamine should be avoided in patients with LQTS as its sympathomimetic properties may precipitate the onset of TdP.

Paralytics:
Succinylcholine is known to prolong the QTc. Rocuronium, vecuronium, atracurium and cisatracurium do not prolong the QTc and are considered safe for use in patients with Timothy Syndrome.

Intraoperative analgesia:
Case reports describing the use of remifentanyl infusions have suggested that it is an excellent sympatholytic intra-operatively, and also during the induction of anaesthesia.

Vasopressors and chronotropes:
The use of vasopressors in the management of hypotension is a balance of risk. Epinephrine, norepinephrine, ephedrine and phenylephrine are known to increase QTc, however case reports of their successful use are published. The authors would recommend optimisation of fluid balance together with the use of metaraminol as this is not known to prolong the QTc.
Atropine and glycopyrolate are thought to be safe.

Antiemetics:
Droperidrol, domperidone and the 5-HT3 antagonists (e.g. ondansetron) prolong the QTc and should be avoided. Metoclopramide is not contraindicated. However, dexamethasone is considered to represent the safest, most effective option.

Central and regional neuroblockade:
The use of central and regional neuroblockade has been described and, if successful, provides excellent analgesia and sympatholysis. However, should any block fail, additional analgesia would be required. Epidural anaesthesia with the gradual establishment of the sympathetic block is preferred to single dose spinal anaesthesia due to the associated lower risk of hypotension with the need for vasopressors. Due to the young age of patients, epidural catheters are placed following the induction of general anaesthesia.

Particular or additional monitoring

The need for invasive monitoring of this group of patients is determined by the type of surgery being performed. Every patient undergoing general anaesthesia should have continuous ECG monitoring, non-invasive blood pressure monitoring at regular intervals, pulse oximetry and capnography as standard throughout induction, maintenance and emergence.

Anaesthetists should have a low threshold for invasive monitoring, especially an arterial line, considering the risk of tachyarrhythmia with associated cardiac instability. Arterial access would also allow regular glucose and electrolyte monitoring. Volume status must be carefully monitored as beta-blocked patients tolerate hypovolaemia poorly.

Possible complications

The anaesthetist must be prepared to deal with malignant arrhythmias particularity TdP. The evidence for the specific treatment of arrhythmias associated with timothy syndrome is based on isolated case reports and empiric treatments of specific arrhythmias.

Electrolyte abnormalities, particularly hypokalaemia, should be corrected. Magnesium is the the drug therapy of choice both for the prevention of repeated and treatment of established TdP. An initial bolus of 30mg/kg should be administered over 2-3 minutes followed by an infusion of 2-4mg/min. For resistant TdP a further bolus may be given after 15 minutes. Plasma magnesium levels should be monitored to avoid toxicity. Magnesium acts as a calcium channel blocker and also promotes membrane stability by the activation of sodium-potasssium ATPase.

Intravenous lidocane is also advocated at a dose of 1-2mg/kg. This may be administered either before or with magnesium and may prevent degeneration of the arrhythmia. Should magnesium prove ineffective temporary overdrive pacing may be necessary. Calcium channel blockers and ranolazine has been found effective in one case report. The most serious sequelae of TdP is the progression to ventricular fibrillation. The anaesthetist must be familiar with advanced paediatric life support algorithms and prepared to deliver asynchronous defribillation and chest compressions.

Postoperative care

In the post-operative period, continuous ECG monitoring in a high dependency environment is advised. The environment should be kept quiet, calm and warm in order to reduce sympathetic stimulation. Senior recovery staff are recommended to care for this cohort of patients. There should be easy access to emergency resuscitation equipment and drugs. The duration of ECG monitoring may be required for up to 24 hours post-surgery.

It is important to rapidly recognize and treat post-operative pain, nausea and vomiting, thus reducing the associated sympathetic stimulation. Serum glucose levels would be monitored, as hypoglycaemia is common and poorly tolerated.

Hypothermia prolongs the QTc, so core temperature should be checked regularly and normothermia maintained. Hypothermia can increase the risk of postoperative infection.

In the longer term, patients required a complete bundle of care including a ventilation strategy if not immediately extubated, plus physiotherapy in order to reduce the risk of chest sepsis.

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 diseases, e.g.:

Not reported.

Ambulatory anaesthesia

Cases of ambulatory anaesthesia are not reported most likely due to the nature of the syndrome and the likely surgical procedures. However, the advantages of early mobilisation of patients post operatively should not be overlooked.

Obstetrical anaesthesia

There are currently no case reports or descriptions of obstetric anaesthetic procedures for patients with Timothy Syndrome. This is most likely attributable to the high infant mortality rate due to significant cardiac comorbidities. However, multiple case reports do exist for obstetric anaesthesia in patients with congenital LQTS.

© Anästh Intensivmed 2019;60:S18-S26 Aktiv Druck & Verlag GmbH

Literature and internet links

1. Splawski I, Timothy KW, Sharp LM, et al. Ca(V)1.2 calcium channel dysfunction causes a multi-system disorder including arrhythmia and autism. Cell 2004;119:19–31
2. Fazio G, Vernuccio F, Grutta G, Re GL. Drugs to be avoided in patients with long QT syndrome: Focus on the anaesthesiological management. World J Cardiol 2013;5(4):87–93
3. Hoshino K, Ogawa K, Hishitani T, et al. Successful uses of magnesium sulfate for torsades de pointes in children with long QT syndrome. Pediatr Int 2006;48(2):112–117
4. An HS, Choi EY, Kwon BS, et al. Sudden cardiac arrest during anesthesia in a 30-month-old boy with syndactyly: a case of genetically proven Timothy syndrome. J Korean Med Sci 2013;28:788–791
5. Yates D, Yates A, Collyer T. A life-threatening complication of the arterial tourniquet in Timothy syndrome. Paed Anaes 2007;17:492–495
6. Nathan AT, Antzelevitch C, Montenegro LM, Vetter VL Case scenario: anesthesia-related cardiac arrest in a child with Timothy syndrome. Anesthesiol 2012; 117:1117–1126
7. Nathan AT, Berkowitz DH, Montenegro LM, et al. Implications of anesthesia in children with long QT syndrome. Anesth Analg 2011;112 (5):1163–1168
8. Curry TB, Gaver R, White R. Acquired Long QT syndrome and elective anaesthesia in children. Pediatr Anesth 2006;16(4):471–478
9. Kies SJ, Pabelick CM, Hurley HA, et al. Anesthesia for Patients with Congenital Long QT Syndrome. Anesthesiol 2005;102:204–210
10. Michaloudis DG, Kanakoudis FS, Xatzikraniotis A, Bischiniotis TS. The effects of midazolam followed by administration of either vecuronium or atracurium on the QT interval in humans. Eur J Anaesthesiol 1995;12:577–583
11. Al-Refai A, Gunka V, Douglas J. Spinal anesthesia for cesarean section in a parturient with long QT syndrome. Can J Anaesth 2004;51:993–996
12. Booker PD, Whyte SD, Ladusans EJ. Long QT syndrome and anaesthesia. Br J Anaesth 2003;90:349–366
13. Staikou C, Chondrogiannis K, Mani A.Perioperative management of hereditary arrhythmogenic syndromes. Br. J. Anaest 2012;108(5):730–744
14. Ganta R, Roberts C, Elwood R, Maddineni V. Epidural anesthesia for cesarean section in a patient with Romano-Ward syndrome. Anesth Analg 1995;81:425–426
15. de Kam PJ, van Kuijk J, Smeets J, Thomsen T, Peeters P. Sugammadex is not associated with QT/QTc prolongation: methodology aspects of an intravenous moxifloxacin-controlled thorough QT study. Int J Clin Pharmacol Ther 2012 Aug;50(8):595–604.

Last date of modification: June 2016

This guideline has been prepared by:

Authors
James Francis, Consultant Anaesthetist, York Teaching Hospital NHS Foundation Trust, Wiggington Road, York, United Kingdom

David Yates, Consultant Anaesthetist, York Teaching Hospital NHS Foundation Trust, Wiggington Road, York, United Kingdom
Corresponding author: drdavidyates@gmail.com

Peer revision 1
Chryssoula Staikou, Anaesthesiologist, Aretaieio Hospital, Medical School, University of Athens, Greece
c_staikou@yahoo.gr

Peer revision 2
Carlo Napolitano, Department of Molecular Cardiology, IRCCS Fondazione Salvatore Maugeri, Pavia, Italy
carlo.napolitano@fsm.it

Herausgeber

DGAI
Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin e.V.
Präsident: Prof. Dr. R. Rossaint, Aachen

BDA
Berufsverband Deutscher Anästhesisten e.V.
Präsident: Prof. Dr. G. Geldner, Ludwigsburg

DAAF
Deutsche Akademie für Anästhesiologische Fortbildung e.V.
Präsident: Prof. Dr. F. Wappler, Köln

Korrespondenzadresse: Roritzerstraße 27 | 90419 Nürnberg | Deutschland
Tel.: 0911 9337812 | Fax: 0911 3938195
E-Mail: anaesth.intensivmed@dgai-ev.de

Verlag & Druckerei

Aktiv Druck & Verlag GmbH
An der Lohwiese 36 |
97500 Ebelsbach | Deutschland
www.aktiv-druck.de

Geschäftsführung
Wolfgang Schröder | Jan Schröder | Nadja Schwarz
Tel.: 09522 943560 | Fax: 09522 943567
E-Mail: info@aktiv-druck.de

Anzeigen | Vertrieb
Pia Engelhardt
Tel.: 09522 943570 | Fax: 09522 943577
E-Mail: anzeigen@aktiv-druck.de

Verlagsrepräsentanz
Jürgen Distler
Roritzerstraße 27, 90419 Nürnberg
Tel.: 0171 9432534 | Fax: 0911 3938195
E-Mail: jdistler@bda-ev.de

Herstellung | Gestaltung
Manfred Wuttke | Stefanie Triebert
Tel.: 09522 943571 | Fax: 09522 943577
E-Mail: ai@aktiv-druck.de

Titelbild
Dipl.-Designerin Monique Minde, Nürnberg

Erscheinungsweise 2019

Der 60. Jahrgang erscheint jeweils zum Monatsanfang, Heft 7/8 als Doppelausgabe.

Bezugspreise (inkl. Versandkosten):

- **Einzelhefte** 30,- €
- **Jahresabonnement:**
  Europa (ohne Schweiz) (inkl. 7 % MwSt.) 258,- €
  Schweiz 266,- €
  Rest der Welt 241,- €

Mitarbeiter aus Pflege, Labor, Studenten und Auszubildende (bei Vorlage eines entsprechenden Nachweises)
Europa (ohne Schweiz) (inkl. 7 % MwSt.) 94,- €
Schweiz 90,- €
Rest der Welt 94,- €

Für Mitglieder der DGAI und/oder des BDA ist der Bezug der Zeitschrift im Mitgliedsbeitrag enthalten.

Allgemeine Geschäfts- und Lieferbedingungen
Die allgemeinen Geschäfts- und Lieferbedingungen entnehmen Sie bitte dem Impressum auf www.ai-online.info

Indexed in **Current Contents®/Clinical Medicine, EMBASE/Excerpta Medica; Medical Documentation Service; Research Alert; Sci Search; SUBIS Current Awareness in Biomedicine; VINITI: Russian Academy of Science.**

Wichtiger Hinweis
Für Angaben über Dosierungsanweisungen und Applikationsformen kann vom Verlag und den Herausgebern keine Gewähr übernommen werden. Derartige Angaben müssen vom jeweiligen Anwender im Einzelfall anhand anderer Literaturstellen auf ihre Richtigkeit überprüft werden. Gleiches gilt für berufs- und verbandspolitische Stellungnahmen und Empfehlungen.

Die Beiträge aus der A&I finden Sie online unter: **www.ai-online.info**

CONTACT US

Please do not hesitate to contact us. We will be glad to answer and provide further information to you at any time.

.....
Name

.....
First Name

.....
Department / Hospital

.....
Place

.....
Telephone

.....
E-Mail

.....
Date / Signature

Please contact me for further information ○

I would like to participate in the project ○

ADDRESS

German Society of Anaesthesiology and
Intensive Care Medicine
Ursula Homberg
Roritzerstrasse 27 | 90419 Nuremberg | Germany
Tel.: +49-911-9337828 | Fax: +49-911-3938195
Email: uhomberg@orphananesthesia.eu