

## Anaesthesia recommendations for **Blue Rubber Bleb Naevus syndrome**

**Disease name:** Blue Rubber Bleb Nevus syndrome

**ICD 10:** D18

**OMIM** 112200

**Synonyms:** Bean syndrome, Gascoyne syndrome

**Disease summary:**

This is a multifocal venous malformation involving the skin, gastrointestinal tract, central nervous system, muscles and viscera. It is caused by somatic mutations of the TEK gene (9p21.2), encoding the angiopoietin 1 receptor. Most cases are sporadic but autosomal dominant inheritance has been observed. The lesions are present at birth or appear during infancy and increase in number and size with age. The skin lesions are bluish, soft, easily compressible and painless (rubber nipples): when biopsied, they typically show cavernous spaces lined with a single layer of endothelial cells and separated by collagenous and fibrous tissue. The intestinal angiomas bleed easily thus producing acute haemorrhage or chronic iron deficiency anaemia. Other locations are: the oro- or nasopharynx, liver, spleen, lung, pleura, peritoneum, vulva, penis, dura mater, brain, parotid etc. Chronic disseminated intravascular coagulation may occur and lead to either thrombosis in case of infection or immobilization, or haemorrhage in case of surgery.

Patients with a large epidural/paraspinal location can develop symptomatic CSF leaks presenting as orthostatic headache. An epidural blood patch is usually ineffective and surgical repair of the dural tears is needed.

In case of frequent gastrointestinal bleeding, extensive visceral surgery including a combination of wedge resection, polypectomy, suture-ligation, segmental resection and band ligation, often associated with intraoperative transoral and transanal endoscopy, can dramatically reduce the risk of further bleeding.

Low-dose Sirolimus (rapamycin), an immunosuppressant with anti-angiogenic properties, is used successfully in some patients to decrease the size of the lesions and the risk of associated complications.

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Medicine is in constant progress; new clinical knowledge may not be in this text.



Recommendations are not rules or laws; they are a framework for clinical decision-making.

Every patient is unique; individual circumstances must guide clinical care.

The diagnosis may be wrong; if questionable, the diagnosis should be confirmed.

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**Find more information on the disease, its centres of reference and patient organisations on Orphanet: [www.orpha.net](http://www.orpha.net)**

## Emergency information

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| <b>A</b> | <b>AIRWAY / ANAESTHETIC TECHNIQUE</b> | Any angiomas in the airway?<br>MRI of spine before any neuraxial block  |
| <b>B</b> | <b>BLOOD PRODUCTS (COAGULATION)</b>   | Preoperative Hb, platelets, fibrinogen and D-dimers<br>Thromboprophylaxis if elevated D dimers<br>Tranexamic acid useful<br>Blood cross-matched |
| <b>C</b> | <b>CIRCULATION</b>                    | Risk of acute haemorrhage   |
| <b>D</b> | <b>DRUGS</b>                          | Check side-effects of sirolimus   |
| <b>E</b> | <b>EQUIPMENT</b>                      | Videolaryngoscopy<br>Thromboelastography  |

## Typical surgery

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In addition to any standard surgery, some procedures are directly caused by the Blue Rubber Bleb Nevus syndrome (BRBNS). They are:

- upper and lower digestive endoscopy either elective or in emergency in case of acute bleeding
- skin biopsies
- skin angioma-reductive plastic surgery
- extensive visceral surgery (wedge resection, polypectomy, suture-ligation, segmental resection and band ligation) associated with intraoperative transoral and transanal endoscopy to
- evacuation of a tissular tumor or haematoma: e.g., cerebral venous malformation
- embolization of sometimes associated major venous malformation or arteriovenous fistula
- laminectomy to repair of associated dural tears causing intracranial hypotension

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## **Type of anaesthesia**

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General anaesthesia is generally used. Due to the possible presence of spinal, epidural and paraspinal lesions and associated complications (dural ectasias and tears), careful imaging (MRI) of the spine should precede any attempt of spinal or epidural anaesthesia.

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## **Necessary additional pre-operative testing (beside standard care)**

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The presence of cutaneous blue rubber blebs should alert for the potential for venous malformations at other localizations: digestive tract, central nervous system, airway. Some teams recommend preoperative total body MRI.

A recent blood count (haemoglobin, haematocrit, platelet count) to exclude anaemia, and a coagulation screen including fibrinogen and D-dimers looking for local chronic disseminated intravascular coagulation are mandatory (see anticoagulation). If the patient is on sirolimus therapy, the following parameters should be checked too: blood glucose, cholesterol and triglycerides, liver enzymes and proteinuria.

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## **Particular preparation for airway management**

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The oral cavity should be carefully inspected looking for venous malformations. There is also a small risk for tracheal and bronchial involvement: in case of oral lesions or of history of haemoptysis, a preoperative fiberoptic examination of the airway is useful.

If venous malformations are present on the lips or in the oral cavity, laryngoscopy should be performed gently, avoiding any contact with the angiomas. Videolaryngoscopy could be a good option in these cases. A supraglottic airway should not be used in the presence of oral lesions.

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## **Particular preparation for transfusion or administration of blood products**

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In case of surgery involving a venous malformation, blood should be typed and cross-matched as brisk haemorrhage may occur for surgical or medical (acute disseminated intravascular coagulation and or fibrinolysis, dilution coagulopathy) reasons.

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## **Particular preparation for anticoagulation**

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A recent platelet count and coagulation screen including fibrinogen and D-dimers (looking for local chronic disseminated intravascular coagulation) is mandatory. In case of elevated D-dimers, preoperative thromboprophylaxis with LMW heparin is recommended to reduce the risk of bleeding. In addition, some haematologists recommend the perioperative administration of tranexamic acid at prophylactic doses.

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### **Particular precautions for positioning, transportation and mobilisation**

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In case of large venous malformation, care should be taken to avoid compressing or injuring it during patient positioning or transportation.

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### **Interactions of chronic disease and anaesthesia medications**

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The presence of chronic anaemia and chronic administration of sirolimus are the main possible source of drug interaction. In addition to its immunosuppressant effects (anaemia, leukopaenia) Sirolimus can indeed induce diabetes mellitus, hypertriglyceridaemia and hypercholesterolaemia.

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### **Anaesthetic procedure**

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There are no special considerations regarding anaesthetic drug choice. The main issue is to avoid traumatizing oral or airway angiomata, as well as cough and vomiting efforts as they increase venous pressure and could favour bleeding. Therefore, deep anaesthesia for laryngoscopy and intubation, as well as deep extubation should be preferred. Antiemetic prophylaxis should also be administered for the same reasons.

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### **Particular or additional monitoring**

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Bedside monitoring of haemoglobin and coagulation status (e.g. thromboelastography) is necessary if the procedure involves venous malformations because there is a major risk of coagulopathy (preoperative subclinical chronic disseminated intravascular coagulation, dilution coagulopathy) and bleeding.

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### **Possible complications**

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The main complication is difficult to control peri-operative haemorrhage. In case of endoscopy for bleeding, there is a small risk of systemic embolization of the inflating gas: it is therefore safer to use, if possible, CO<sub>2</sub> rather than air to inflate the digestive tract.

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### **Post-operative care**

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In addition to standard post-operative considerations regarding oxygenation, ventilation, analgesia and hydration, special attention should be paid to detect overt or occult bleeding: monitoring of blood pressure and heart rate, urine output.

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### **Disease-related acute problems and effect on anaesthesia and recovery**

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Acute haemorrhage can necessitate anaesthesia for emergency surgery or endoscopy. Either classic or controlled rapid sequence induction technique should be used taking into account the risk of airway involvement, hypovolaemia, anaemia and the risk of coagulopathy.

## **Ambulatory anaesthesia**

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Ambulatory anaesthesia is possible for procedures not involving a venous malformation and if chronic intravascular disseminated coagulation is either absent or controlled with prophylactic thromboprophylaxis.

If the procedure is minor and involves a venous malformation (e.g. angioma-reductive surgery), thromboprophylaxis and a prolonged stay in the day care unit are mandatory.

## **Obstetrical anaesthesia**

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A few cases of obstetric care of women with BRBNS have been published. The same considerations regarding the airway, digestive and spinal lesions should apply as for non-pregnant patients. As the venous malformations expand during pregnancy, imaging, blood count and coagulation screen should be performed during the last trimester of pregnancy. In addition, the presence of lesions in the birth canal is an indication for caesarian section.

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