orphanaesthesia

Anaesthesia recommendations for patients suffering from **Immune thrombocytopenia (ITP)**

Disease name: Immune thrombocytopenia (ITP)

ICD 10: D69.3

Synonyms: Immune thrombocytopenic purpura, idiopathic thrombocytopenic purpura

Immune thrombocytopenia, previously known as idiopathic thrombocytopenic purpura (ITP), is an autoimmune disease that is related to anti-platelet immunoglobulin (IgG) production. The production of IgG autoantibodies is critically dependent on cellular immune mechanisms particularly relating to T cells. The production of these autoantibodies by B cells depends on a number of cellular mechanisms that form a network of modulation, with T cells playing a pivotal role in pathophysiology. T-cell-mediated cytotoxicity is an alternative mechanism for platelet destruction in ITP (1-3). Other causes are included genetic factors (immune genes-FcR, immune syndromes, platelet antigens) and susceptibility to initial event (infection, inflamination) (4). Immune thrombocytopenia is characterised by increased mucocutaneous haemorrhage risk with low platelet counts (5).

Medicine in progress

Perhaps new knowledge

Every patient is unique

Perhaps the diagnostic is wrong

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Disease summary

Purpura are not seen in many patients, and ITP was shortened to immune thrombocytopenia. The diagnosis of immune thrombocytopenia is made via the exclusion of other factors that cause thrombocytopenia. The frequency of ITP in adults per year is 1.6-6.6 per 100,000 (6).

The incidence of ITP in adults in adults is approximately equal for the sexes except in the mid-adult years (30-60 years), when the disease is more prevalent in women (7-9). The initial hypothesized cause of ITP was increased platelet destruction at a rate that exceeded production by compensating bone marrow. New knowledge questions this model and provides evidence that platelet production is also decreased in many ITP patients (5). There is no `gold standard' test that reliably establishes the diagnosis. However, a positive response to an ITP-specific therapy, e.g., intravenous immunoglobulin (IVIg) and/or steroids, is supportive of the diagnosis.

The stages of immune thrombocytopenia were re-defined:

a) Newly diagnosed ITP covers the first 3 months after diagnosis
b) Persistent ITP covers 3-12 months after diagnosis and cases that do not enter spontaneous remission or do not remain in remission after treatment cessation
c) Chronic ITP encompasses the group with ITP that lasts 12 months or longer.

The primary target of ITP treatment is the prevention of major haemorrhage by attaining a safe thrombocyte count, but not the return of thrombocyte counts to normal. A level of 50 x 109/L may be sufficient in ITP patients with generally good functioning platelets. Adults with platelet counts less than 30 × 109/L are generally treated. Multiple large cohort studies reported that patients with platelet counts above that level were safely observed without treatment (10,11).

The incidence of haemorrhagic diathesis increases with age (12), and the effect of this condition on quality of life (13,14), mortality and morbidity should be considered (15,16). Studies of co-morbidities and risk factors in large series of ITP patients with long follow-ups are rare (17,18). Studies of surgical complications and mortality were only conducted for splenectomy procedures (19). The global features of adverse postoperative outcomes for ITP patients undergoing all types of surgical procedures have not been studied in a population-based cohort (20,21).

Typical surgery

Splenectomy is a surgical procedure that is specific to ITP patients. Splenectomy should not be performed until 12 months from diagnosis if possible because of the possibility of spontaneous remission during this period (22). However, the lack of response to more than one medication and findings of severe bleeding may add splenectomy to the agenda earlier in newly diagnosed or persistent ITP patients. Eighty percent of patients respond to splenectomy, and the response is permanent in 66% of patients, who do not require additional treatment for at least 5 years.

Emergency splenectomy may be performed in ITP patients with active haemorrhage and platelet counts <50 x 10^9/L. Splenectomy may be performed as an open or laparoscopic surgery.

All types of surgical procedures may be performed in patients with an ITP diagnosis. The critical factor is whether the decision for the surgical procedure is emergency or elective. An urgent increase in platelet count may be required for some thrombocytopenic patients who

require surgical procedures but are at a high risk of bleeding. Switching from corticosteroids to IVIg, anti-D or recombinant factor VIIa (rfVIIa) may be effective in emergency settings, but a combination of first-line therapies is appropriate (23-28). Subsequent maintenance therapy with the oral combination of danazol (10-15 mg/kg) and azathioprine (2 mg/kg). There is also some evidence of rapid response to vinca alkaloids (8). Combination chemotherapy is a useful approach for patients with ITP refractory to conventional treatments both for acute induction and for long-term maintenance therapy (29). Prednisone and IVIg are recommended for the emergency treatment of patients with uncontrolled bleeding. High-dose methylprednisolone (HDMP) may also be useful in this setting. Other therapies that work rapidly include platelet transfusion, possibly in combination with IVIg, and emergency splenectomy (23).

Table 1. Suggested treatment algorithm for anaesthesia induction in patients with ITP

	Operating setting	
	Elective operation	**Emergency operation**
During anaesthesia induction	Assess using the current guideline treatment of ITP approach • ***Platelet transfusion is not necessarily • Ensure that appropriate further expert (hematologist) help and advice is obtained at the most appropriate time for the patient. • The best time in operation is planned for the patient	Whatever the count of platelets was operated Ensure that appropriate combination chemotherapy and/or ***Platelet transfusion treatment may be possible • IVIg (1 $g.kg^{-1}$ or 2 $g.kg^{-1}$) • metilprednizalon (30 $mg.kg^{-1}$) • vinca alcoloids (0.03 $mg.kg^{-1}$) • anti-D (50-75 $\mu g.kg^{-1}$) • rfVIIa (50-122 $\mu g.kg^{-1}$) Ensure that appropriate further expert (hematologist) help and advice is obtained at the most appropriate time for the patient.

***:** make decision of platelet transfusion

Type of anaesthesia

A large body of literature references and guidelines aid the decision-making process, such as the recently updated evidence-based guidelines of the American Society of Regional Anesthesia and Pain Medicine for patients receiving antithrombotic or thrombolytic therapy. However, no explicit recommendations or guidelines exist for patients with haemorrhagic diathesis, such as von Willebrand disease (vWD), haemophilia A and B and ITP. ITP patients often present with low platelet counts.

The primary concern for regional anaesthesia in thrombocytopenic patients is the risk of neuraxial haematoma development secondary to haemorrhage (30). Spinal or epidural anaesthesia are generally considered safe when the platelet count is over 80 x 10^9/L. However, the consistently low platelet counts in ITP seem less problematic than rapidly falling values due to other diseases, which are often accompanied by platelet dysfunction or coagulopathy. Neuraxial anaesthesia was successfully performed in several studies with platelet counts between 50 and 80 x 10^9/L. (23).

Nevertheless, the minimum safe platelet count for neuraxial blockade is undefined in these patients. Evidence-based recommendations for neuraxial anaesthesia in patients with haemophilia, vWD or ITP cannot be offered.

Each patient must be treated individually. Veen et al. (31) reviewed the current guidelines, case series and case reports on epidural and spinal anaesthesia and lumbar punctures (LPs) in thrombocytopenic patients. This review reported that a platelet count of 80 x 10^9/L was a safe count for the placing/removing an epidural or spinal anaesthetic, and 40 x 10^9/L was a safe count for LP in the conclusion.

This topic emphasised the necessity to ensure the following points: platelet count should be stable; coagulopathy should not be congenital or acquired; the patient should have normal platelet functions without the use of an anti-platelet agent; and 12 h should have elapsed from the last dose of a prophylactic dose of low molecular weight heparin, or 24 h after a therapeutic dose before an epidural or spinal anaesthetic is placed (33). However, Veen et al. (31) suggested for patients with platelet counts of 50–80 x 10^9/L requiring epidural or spinal anaesthesia and patients with a platelet count 20–40 x 10^9/L requiring a LPs, based on an individual risk assessment.

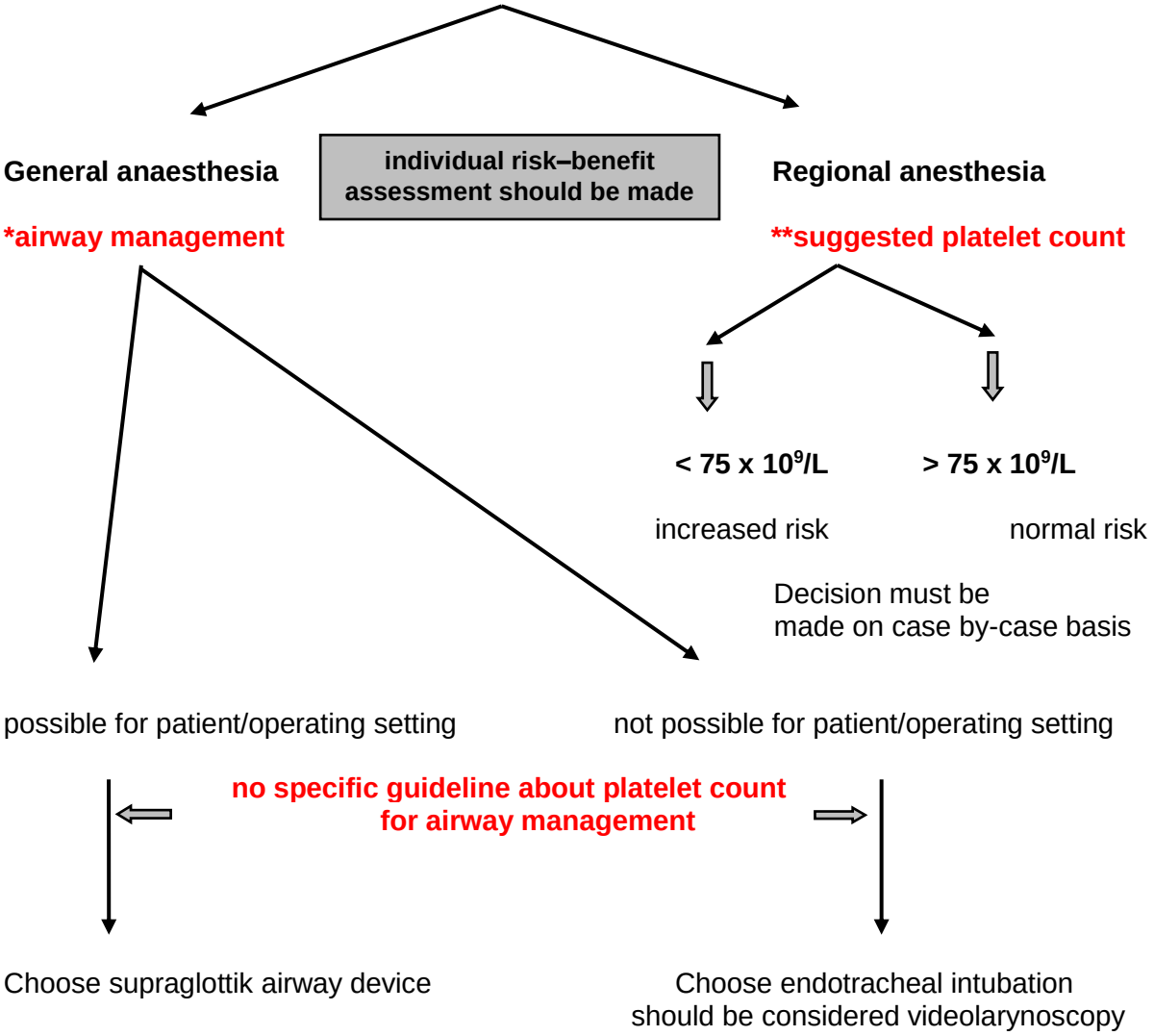
It is possible that lower platelet counts may also be safe but there is insufficient published evidence to make recommendations for lower levels at this stage (31). Some degree of thrombocytopenia is a relatively common occurrence, but what number constitutes a safe platelet count for these techniques based on the occurrence of spinal haematomata is debated. *The Association of Anaesthetists of Great Britain & Ireland, The Obstetric Anaesthetists' Association Regional Anaesthesia* is published about regional anaesthesia and patients with abnormalities of coagulation (32).

In idiopathic thrombocytopenic purpura and gestational thrombocytopenia, there are reduced platelet numbers, but normal function. In these situations, expert opinion is that an experienced anaesthetist might reasonably perform a neuraxial blockade providing the platelet count is > 50 x 10^9/L and stable, but an individual risk–benefit assessment should be made (32,36-39). If platelets 50-75 x 10^9/L there are increased risk, if platelets 20-50 x 10^9/L there are high risk, if platelets <20 x 10^9/L there are very high risk (32).

It is possible that spinal anaesthesia with platelet counts below this level may be safe if data are extrapolated from that derived from lumbar punctures in non-pregnant patients performed by haematologists using needles considerably larger than those used by obstetric anaesthetists (33). A stable level of 40 x

All kind of general anaesthesia methods may be used for emergency and elective surgeries in patients with an ITP diagnosis.

Figure 1. Suggested anaesthesia managament algorithm for ITP



Notes to figure 1

***:** There is no consensus associated with control of platelet count for reducing the airway trauma and bleeding in ITP patients.

****:** For lower platelet counts a careful analysis of benefit against risk of vertebral canal hematoma is needed, and multidisciplinary is discussion encouraged.

ITP patients have reduced platelet numbers, but normal function. In these situations, expert opinion is that an experienced anaesthetist might reasonably perform a neuraxial blockade providing the platelet count is > 50 x 10^9/L and stable, but an individual risk–benefit assessment should be made (considered attemp insertion, needle size). (32,36-39).

Association of Anaesthetists of Great Britain & Ireland (2013); If platelets 50-75 x 10^9/L there are increased risk, if platelets 20-50 x 109/L there are high risk, if platelets <20 x 10^9/L there are very high risk (32).
Veen et al.(2010); they suggested for patients with platelet counts of 50–80 x 10^9/L for epidural and spinal anaesthesia (31).

Choi et.al (2009); when the platelet count is more than 50 x 10^9/L before block performance. The minimum “safe” factor levels and platelet count for neuraxial blockade remain undefined in both the obstetric and general populations and evidence-based recommendations for neuraxial techniques in the setting of hemophilia, vWD, or ITP cannot be offered (41).

Provan et al. (2009); Obstetric anesthetists generally recommend a platelet count of at least 75 109/L to allow administration of spinal or epidural anesthesia. Hematologists believe that a platelet count of at least 50 x 10^9/L is adequate to allow for cesarean section (9).
British Committee for Standards in Haematology General Haematology Task Force (2003) (54).

Orlikowski et.al. (1996); The authors suggested that parturients with platelet counts greater than 75 x 10^9/L should not be denied regional anaesthesia (36).

Necessary additional diagnostic procedures (preoperative)

There is no need for diagnostic research beyond platelet count in the preoperative period. Blood group should be typed, and it may be beneficial to obtain information on peripheral smear platelet functions. A thrombocyte dysfunction evaluation should be performed in collaboration with haematology, anaesthesiology and surgery (34). Preoperative thrombelastography (TEG) and a patient-specific evaluation may be beneficial for decisions on regional anaesthesia (34-39). The maximum amplitude (MA) likely represents platelet function in TEG. Growing evidence indicates that measures to support and monitor coagulation, such as TEG and thrombelastometry (ROTEM), are important for quality improvement and may offer alternative effective approaches to limit blood transfusion and decrease perioperative bleeding (40).

Currently Platelet Function Analyzer is a rapid, easy and sensitive test of platelet functions that is an alternative to a bleeding time test. It is frequently used to diagnose congenital or acquired platelet diseases like von Willebrand disease (vWD), Glanzman thromboasthenia and Bernard Soulier syndrome. Additionally, it is used to assess the efficacy of medication like acetyl salicylic acid, clopidogrel and ticlopidine used for antiplatelet treatment (42). The Platelet Function Analyzer (PFA)-100 is a device for quantitative, rapid, in vitro measurement of platelet functions (43). The PFA-200 is a newer version of the PFA-100 (44). The PFA-200 device includes a thin membrane covered with collagen/epinephrine or collagen/adenosine diphosphate (ADP). When blood flow passes through this membrane, adhesion activation and aggregation of platelets occurs forming a plug. The time for this plug to cover the membrane is named the “closure time (CT)” (45,46). Generally, there is an inverse correlation between the reduction in platelet count and CT value.

Patient characteristics such as a platelet count <100 x 109/L and haematocrit <30% usually result in prolongation of the CT (47,48). Slaughter et al. (49) found that normal collagen and ADP closure time was a good negative predictor of bleeding, but elevated closure time had little positive predictive value. Forestier et al. (50) found that PFA-100 results correlated with postoperative bleeding. Publications related to PFA have mainly been completed on patients undergoing cardiac surgery. In the literature, there are insufficient studies comparing the correlation of platelet counts, prognosis, bleeding findings and laboratory findings for platelet function disorder in the presence of thrombocytopenia.

A study by Ugur et al. (51) retrospectively compared clinical findings and laboratory values of patients with platelet function (collagen/epinephrine (coll/EPI) or collagen/ADP (coll/ADP)) studied due to thrombocytopenia with different etiologies and bleeding diathesis. Platelet function tests were assessed using a PFA-200 (INNOVANCE PFA-200 System Siemens Healthcare Global, Marburg, Germany). The diagnoses of thrombocytopenia patients included in the study were immune destruction (n=14), solid organ (n=19) and haematologic malignancy (n=9). Six of the patients with solid organ malignancy and one patient with haematologic malignancy had bleeding findings while none of the immune thrombocytopenia patients had bleeding findings. When patients are grouped in terms of pathogenesis of thrombocytopenia, 28 had bone marrow suppression and 14 had destruction-linked thrombocytopenia. When these two groups were compared, all seven patients with bleeding findings were in the group with bone marrow suppression-linked thrombocytopenia. In terms

of collagen/ADP and collagen/ephinephrine CT values, there was no significant difference observed between the two groups.

Particular preparation for airway management

Bleeding after airway trauma and intubation is very important in ITP patients. There was concern that laryngoscopy and tracheal intubation may lead to damage of mucosal surfaces, particularly around the laryngeal inlet and trachea, with subsequent haemorrhage (23). Consensus has not been reached concerning the selection of therapeutic method and there is no specific guideline about platelet count concerning the trauma of airway in ITP patients.

Based on some research, increasing the platelet count by high-dose IVIg therapy or platelet transfusion is helpful to reduce the complications associated with airway trauma in ITP patients (52). Additionally for airway management supraglottic airway devices, which allow less traumatic insertion compared to endotracheal intubation, should be considered (53). If intubation is definitely necessary, the use of videolaryngoscopy allows easy and successful intubation with less traumatic intervention.

Particular preparation for transfusion or administration of blood products

Transfusions of platelet concentrates are helpful at the time of induction. The exact platelet count that is needed for any procedure is not known, but the following counts are offered for guidance (54):

- Dentistry (descaling, deep cleaning) ≥ 20-30 x 10^9/L
- Simple extractions ≥30 x 10^9/L
- Complex extractions ≥50 x 10^9/L
- Regional dental block ≥30 x 10^9/L
- Minor surgery ≥50 x 10^9/L
- Major surgery ≥80 x 10^9/L
- Vaginal delivery and caesarean section ≥50 x 10^9/L
- Spinal or epidural anaesthesia ≥80 x 10^9/L

Rapid-effect medication should be used if the operation is an emergency, and it is necessary to urgently increase the platelet count in the preoperative period. IVIg (1 g/kg single dose or 2 doses if necessary) + corticosteroids (pulse or moderate-high dose) followed by thrombocyte suspension support is the most frequently chosen combination. Thrombocyte suspensions should not be used in ITP patients to resolve thrombocytopenia except in cases of emergency, life-threatening haemorrhages because these suspensions produce a rapid disintegration of platelets. If thrombocyte suspension use is necessary, then it should be administered after IVIg and/or pulse corticosteroid administration to increase the life span of transfused platelets. Plasmapheresis treatment should not be used in these patients (55). Treatment is rarely indicated in patients with platelet counts above 50 x 10^9/L in the absence of the following conditions: bleeding due to platelet dysfunction or another haemostatic defect, trauma, surgery (56); clearly identified comorbidities for bleeding; mandated anticoagulation therapy; or in persons whose profession or lifestyle predisposes them to trauma. Patient preference must also be considered when discussing treatment options. Detailed consensus-based recommendations for target platelet counts during surgery in adults were provided previously (57).

Particular preparation for anticoagulation

There is no evidence to support the need of a particular anticoagulation strategy. Anticoagulant agents may be used in ITP patients for other comorbidity reasons, such as thrombosis, stents or heart valve disease. Planning before an elective surgery in an ITP patient using anticoagulants should include the regulation of anticoagulant medication treatment and/or low molecular weight heparin, which should be evaluated with the current disease and characteristics of the planned surgery, and any decisions made should be specific to the patient.

Antifibrinolytic agents, such as oral or IV tranexamic acid and episilon-aminocaproic acid, may be useful in preventing recurrent bleeding in patients with severe thrombocytopenia. However, the efficacy of these agents has not been evaluated using randomized trials in ITP patients. Tranexamic acid (1 g, 3 times daily, orally) and episilon-aminocaproic acid (1-4 g every 4-6 hours, maximum dose, 24 g/day) may be especially valuable in certain dental or surgical procedures (9).

Particular precautions for positioning, transport or mobilisation

No special position or mobilisation is defined for ITP patients. Postoperative haemorrhage monitoring should include the clamping of surgical drains during transport, and extra care and attention should be paid to prevent drain loosening.

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

No specific interactions are known. The use of aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs) in patients with any of thrombocytopenic disorders can dramatically shift the relationship between platelet count and platelet function. Therefore, these drugs should not be used in patients with thrombocytopenia. Data from compatibility and interaction studies with other drugs are not available.

Anaesthesiologic procedure

Emergency surgeries should proceed regardless of platelet count. Platelet transfusion may be given to rapidly increase platelet count during anaesthesia induction if the platelet count is low.

ITP diagnoses should be defined as acute or chronic for non-emergency surgeries. Treatment stages of the American Society of Hematology guidelines (62) or the country's own haematology society guidelines should be followed. ITP patients who respond to treatment should complete surgery preparations and undergo surgery.

The anaesthesiologist should make the decision for general or regional anaesthesia based on the patient's clinical characteristics, current platelet count and function, type of surgery to be performed, and characteristics, such as the scale and possibility of bleeding. It is appropriate for the anaesthesiologist to evaluate an ITP patient undergoing surgery with a haematologist and the surgeon. However, final judgment for the care of individual patients should lie with the responsible health care professional and be based on the careful investigation of individual circumstances.

Particular or additional monitoring

Additional monitoring is dependent on the type of surgery. Arterial and central venous lines should be considered in patients with expected bleeding due to surgery.

Possible complications

The risk of fatal haemorrhage is very low, but the risk of severe bleeding is increased in the very old, patients with additional diseases that cause haemorrhage (>65 years with a previous history of haemorrhage, gastrointestinal problems, liver cirrhosis, uncontrolled hypertension) and patients using medication (aspirin, Coumadin, NSAID, etc.). Bleeding prevention should be normally accomplished for the given surgical procedure.

Post-operative complications of splenectomy include bleeding, infection, thrombosis, prolonged hospitalisation, hospital readmission, and the requirement for additional intervention (58). Reported complication rates vary considerably (59-62) and may be greater in patients aged 65 years or older (63). A recent systematic analysis reported that splenectomy complication rates were 12.9% with laparotomy and 9.6% with laparoscopy, and mortality was 1.0% with laparotomy and 0.2% with laparoscopy (58). ITP (64) and splenectomy (65) are related to the risk of thromboembolism. Appropriate thromboembolism prophylaxis should be provided for these patients. Caution is advised for postoperative complications in patients suffering from prolonged immobilisation and/or hospitalisation.

Postoperative infection risk is increased, especially in ITP patients receiving immune suppressive treatment. Splenectomised patients are at a lifelong risk for uncontrolled infection with poor outcome from *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenza*. Immunisation with polyvalent pneumococcal, *Haemophilus influenza* (B) and meningococcal vaccines should be administered at least 2 weeks before surgery to reduce the risk of overwhelming postoperative bacterial sepsis (66).

There is a relationship between postoperative complications after any type of surgery in ITP patients and preoperative ITP history, emergency application, hospital stay, and preoperative platelet and/or red blood cell transfusion. The administration of blood products to these patients before surgery is one cause of a negative prognosis that is independent of ITP itself (67).

Postoperative care

The degree of postoperative monitoring is dependent on the surgical procedure and preoperative condition of the patient. Intensive care and ventilator support may be necessary in the postoperative period despite the selection of appropriate anaesthesia methods that account for bleeding risk from the interventions to the patient.

Information about emergency-like situations / Differential diagnostics

Situations of unexpected bleeding during surgery must be analysed to determine whether the bleeding is related to thrombocytopenia linked to ITP or other reasons that increase intraoperative bleeding (e.g., hypothermia, surgical procedures, such as liver resection, cardiac surgery and neurosurgery, NSAID use, massive blood transfusion, and disseminated intravascular coagulopathy). The ESA management of severe perioperative bleeding

guidelines recommend that a treatment protocol should be initiated using a goal-directed approach that is appropriate to the patient.

Ambulatory anaesthesia

Ambulatory anaesthesia guidelines may be generally followed in ITP patients who are controlled by treatment with no additional predicted haemostasis problems in the preoperative period and platelet counts within recommended limits for the planned surgery (57). However, there is no evidence-based approach that is defined for ambulatory anaesthesia for elective minor and day-case surgeries (68).

Obstetrical anaesthesia

The decision for Caesarean section or vaginal birth for mothers with ITP should be based on obstetric indications. The incidence of pregnant women with ITP is 1-2/1000, but ITP comprises 5% of pregnancy-related thrombocytopenia cases, and 15% of pregnant women with ITP had platelet counts lower than 50 x 10^9/L at the time of birth (69,70). Women with immune thrombocytopenia may become pregnant, or the disease may occur for the first time during pregnancy. The pathogenesis of ITP in pregnancy is similar to non-pregnant patients. Laboratory findings consist of isolated thrombocytopenia before pregnancy and during early pregnancy. Clinical signs of altered coagulation, such as petechiae and easy bruising, despite normal haemostasis or the prevention of bleeding in pregnant women with ITP who have a platelet count ≤20 x 10^9/L comprise the most important issues for anaesthesia practice, and these patients require urgent management (71,72). Foetuses of these mothers are also at increased risk for thrombocytopenia and bleeding.

The management of anaesthesia in Caesarean section should not be based on a single parameter in pregnant women with severe thrombocytopenia. Platelet count and other laboratory findings should be paired with TEG and clinical findings to render a decision after considering the patient-specific risks and benefits for the use of general or regional anaesthesia.

The guidelines of British Committee for Standards in Haematology recommend a platelet count of at least >80 x 10^9/L for the use of neuraxial techniques in pregnant women with ITP (19). However, most anaesthesiologists and authors reported that they used neuraxial blockade techniques, particularly spinal anaesthesia, in healthy asymptomatic pregnant women with ITP who had platelet counts >50 x 10^9/L (54, 73, 74). The use of TEG, which may also be used bedside, is currently recommended (36-38). A maximal amplitude of 53 mm in TEG may indicate that the platelet count is 54 x 10^9/L, and coagulation will be sufficient. Some authors concluded that coagulation tests alone do not effectively predict the risk of epidural or spinal haematoma following neuraxial block. However, a normal TEG tracing, if supported by laboratory findings that are consistent with normal clinical findings, may facilitate a decision to conduct a neuraxial technique (37). Steer (38) suggested that TEG may be used as a rapid, reliable and cost-effective tool to obtain coagulation data, which is required in obstetric patients for optimal obstetric and anaesthetic management. Platelet function analyser test measures the speed of formation of a platelet plug in *vitro*, expressed as closure time in seconds. Studies in parturients suggest that it is an effective bedside test of platelet function (75); however,evidence is lacking to support it's routine use (76).

Platelet transfusion alone is generally not effective in ITP, but platelet transfusion in conjunction with IVIg may be considered if an adequate platelet count has not been achieved and delivery is emergency. Also posttransfusion increments may be inadequate or short-lived

and should be reserved to treat bleeding only (77). Oral prednisone (or prednisolone) may be initiated 10 days prior to the anticipated delivery at a dose of 10-20 mg daily and titrated as necessary in women whose platelet counts are < 80 x 10^9/L and who have not required therapy during pregnancy.

Obstetric indications should determine the mode of delivery because of the difficulty in predicting severe thrombocytopenia in neonates and the very low risk of intracranial haemorrhage (<1.5%) or mortality (<1%) (54). Percutaneous umbilical blood sampling or foetal scalp blood sampling is not helpful in predicting neonatal thrombocytopenia, and it is potentially harmful. Therefore, these procedures are not recommended. Infant platelet count occurs 2-5 days after delivery, and a spontaneous rise occurs by day 7.
Pregnant women with ITP should be aware of VTE despite thrombocytopenia. Postpartum mechanical precautions against VTE should be performed (e.g., compression stockings, pneumatic compression at intervals).

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