Summary of recommendations

Adult

All recommendations are newly drafted by the Thoraco-Abdominal Trauma Specialist Advisory Group (SAG), unless indicated otherwise.

I. INITIAL ASSESSMENT AND MANAGEMENT

A. Initial resuscitation and management of the patient with blunt abdominal trauma should follow the Advanced Trauma Life Support® (ATLS®) principles.

B. In centres with surgical capability, the on-call general surgeon should be consulted promptly when a splenic injury is suspected or proven.

II. OPERATIVE MANAGEMENT

A. In centres with general surgical capability, urgent splenectomy should be performed for a hemodynamically unstable patient with a splenic injury who is not responding to appropriate resuscitation.

B. Grade or severity of splenic injury is not, in and of itself, an indication for surgical management of the injured spleen. The decision to proceed to splenectomy should be based on the clinical presentation of the patient and situational context, which includes the capabilities of the site, resources available, presence of other injuries, transport availability, and transfer related issues.

C. A general surgeon should be involved early in decision-making for suspected or proven splenic injury. Tele-conferencing through Patient Transfer Network (PTN) to discuss optimal management (transport vs. splenectomy) should be performed. The conference call should include the sending physician, the receiving general surgeon and the receiving Trauma Team Leader (TTL) at the higher level of care (HLOC) trauma referral centre.

III. NON-OPERATIVE MANAGEMENT

A. A trial of non-operative management (NOM) for splenic injury is indicated in patients with proven splenic injury who are hemodynamically stable after appropriate resuscitation. There are no absolute contraindications to a trial of NOM of known splenic injury in the hemodynamically stable or stabilized patient.

B. Hemodynamically stable patients with negligible risk* of ongoing or delayed hemorrhage may be safely managed, without higher level of care (HLOC) transfer, in a rural/remote facility provided at least 2 units of packed red blood cells are available. This management plan should be reviewed with a general surgeon and Trauma Team Leader (TTL) on call at the HLOC trauma referral centre in sites without surgical capabilities.

* CT-confirmed Grade 1 to 2 splenic injuries without evidence of active hemorrhage or pseudoaneurysm, anticoagulated patient, associated major injury, age ≥65 years or limited physiologic reserve.

C. NOM of Grade 3 to 5 splenic injuries should only be considered in a hospital that has capabilities for physiologic monitoring and serial clinical evaluations by a general surgeon are possible. The hospital also needs 4 or more units of blood available, CT imaging, and 24-7 operating room access. Access to 24-7 interventional radiology for angiography/angioembolization is preferred but not essential. For transfer indications, see **V. TRANSFER TO HIGHER LEVEL OF CARE** below.

IV. ANGIOGRAPHY/ANGIOEMBOLIZATION

A. Emergent angiography/angioembolization is indicated in hemodynamically unstable patients with immediate access to interventional radiology who have responded to appropriate resuscitation and demonstrate active vascular extravasation on contrast CT. The higher level of care transfer of splenic injury patients that are or have been unstable for the purposes of **urgent** angioembolization is not recommended if the patient is in a centre with general surgical capability and can perform splenectomy.

B. Emergent angiography/angioembolization is indicated in hemodynamically stable patients with major free extravasation not likely to abate.

C. Angioembolization within 72 hours is indicated in hemodynamically stable or stabilized patients with pseudoaneurysm or arterio-venous fistula identified on CT or ultrasound imaging.

D. Patients with splenic injury demonstrating contrast blush on CT are at an elevated risk for failing non-operative management (NOM). The consulting surgeon and interventional radiologist should communicate once initial imaging is completed and collaborate on a management plan in the event of failure of NOM.

E. In centres without interventional radiology capability, if follow-up imaging demonstrates an indication for angioembolization, patients should be transferred under the care of a general surgeon to a higher level of care (HLOC) trauma referral centre for this procedure within 48 hours.

F. In the presence of a single vascular abnormality (contrast blush, pseudo-aneurysms, and arterio-venous fistula) in minor and moderate injuries, the currently available literature is inconclusive regarding whether proximal or distal embolization should be used. In general, selective angioembolization is preferred, where safe and feasible. [Adopted from WSES with modification]

V. TRANSFER TO HIGHER LEVEL OF CARE (HLOC)

Immediate Transfer (< 24 hours):

A. Patients who are hemodynamically stable with associated major injuries requiring urgent higher level of care (e.g., traumatic brain injury) should be transferred promptly to a Level 1 or 2 trauma centre.

B. Hemodynamically stable patients with negligible risk* of ongoing or delayed hemorrhage may be safely managed, without higher level of care (HLOC) transfer, in a rural/remote facility provided at least 2 units of packed red blood cells are available. This management plan should be reviewed with a general surgeon and Trauma Team Leader (TTL) on call at the HLOC trauma referral centre in sites without surgical capabilities.

* CT-confirmed Grade 1 to 2 splenic injuries without evidence of active haemorrhage or pseudoaneurysm, anticoagulated patient, associated major injury, age ≥65 or limited physiologic reserve.

C. Patients with Grade 3 to 5 splenic injuries or associated major injury should be transferred to an appropriate trauma referral centre. Centres receiving these patients should have IR capability to facilitate angioembolization if needed. A general surgeon must be actively involved in the transfer process and the ongoing care of transferred patients.

D. The HLOC transfer of splenic injury patients that are or have been unstable for the purposes of **urgent** angioembolization is not recommended if the patient is in a centre with general surgical capability and can perform splenectomy.

E. For patients undergoing emergent splenectomy prior to HLOC transfer, arrangements for transfer through Patient Transfer Network (PTN) should be made as early as possible, preferably pre-operatively or intraoperatively to avoid delay.

Delayed Transfer (> 24 hours):

F. In centres without IR capability, if follow-up imaging demonstrates an indication for angioembolization, patients should be transferred under the care of a general surgeon to a HLOC trauma referral centre for this procedure within 48 hours.

VI. ACUTE HOSPITAL CARE

A. Patients with Grade 1 to 2 splenic injuries can be monitored in a general surgery ward. The patient should have good IV access and be assessed frequently for vital signs.

B. Patients with Grade 3 to 5 splenic injuries undergoing non-operative management (NOM) should be observed initially in a monitored intermediate care unit or intensive care unit (ICU). Appropriate initial monitoring includes the capacity to provide hourly vital signs as well as cardiac, oxygen saturation and urine output monitoring. Serial examination by a general surgeon is essential.

C. Hemoglobin should be monitored at regular intervals until stabilized.

D. It is recommended that therapeutic anticoagulation be reversed promptly in patients with high risk splenic injury, unless the risk of reversal is considered higher than the risk of splenic hemorrhage.

E. Repeat CT imaging in hemodynamically stable patients should be obtained within 72 hours post-injury for Grade 3 to 5 splenic injuries. Any changes in clinical status should prompt urgent reassessment, including laboratory investigations and/or CT as appropriate.

F. There is no need to restrict mobilization in patients with splenic injury and early mobilization is encouraged. Patients with high risk injuries* should remain supervised until assessed as safe to ambulate independently off unit.

* CT-confirmed Grade 3 to 5 splenic injuries, particularly with evidence of active haemorrhage or pseudoaneurysm, anticoagulated patient, associated major injury, age ≥65 or limited physiologic reserve.

G. Post-discharge, patients with Grade 3 to 5 splenic injuries should avoid contact sports or vigorous activities for at least 8 weeks. Patients with Grade 3 to 5 splenic injuries should be re-imaged prior to resuming high-risk activities.

VII. VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXIS

A. Pharmacologic prophylaxis to prevent venous thromboembolism (VTE) can be used for patients with isolated blunt splenic injuries without increasing the failure rate of non-operative management. Although the optimal timing of safe initiation has not been determined, deep vein thrombosis (DVT) prophylaxis may be started as soon as possible after trauma and within 12 hours for every Grade of splenic injury (e.g., 36 hours for Grade 3 injury) or sooner if hemoglobin is stable. [Adopted from EAST and WSES with modification]

B. Mechanical prophylaxis should be used in all patients with absolute contraindication to pharmacologic prophylaxis, except in patients with lower extremity trauma in which case mechanical prophylaxis is not efficacious. [Adopted from WSES with modification]

VIII. OVERWHELMING POST SPLENECTOMY INFECTION (OPSI) PROPHYLAXIS

A. Patients should receive immunization against the encapsulated bacteria (*S. pneumoniae*, *H. influenzae*, and *N. meningitidis*) post-splenectomy or post-proximal angioembolization. Refer to national guidelines for vaccine dosage. [Adopted from WSES with modification]

B. Revaccination against pneumococcus is recommended every 10 years.

C. Vaccination should be administered >14 days post-splenectomy/embolization. For patients where follow-up is a concern, vaccination prior to discharge is recommended. [Adopted from EAST and WSES]

NEW

D. Regarding infection prophylaxis in asplenic and hyposplenic adult patients, follow the British Columbia Centre for Disease Control (BCCDC) guidelines for Anatomic or Functional Asplenia.

IX. POST HOSPITAL CARE

A. Post-discharge outpatient follow-up with imaging is recommended within 12 weeks. Patients with Grade 1 to 2 injuries should avoid contact sports or vigorous activities for at least 8 weeks. Grade 3 to 5 splenic injuries should be re-imaged at 8 weeks if the patient plans to resume high risk activities to rule out pseudoaneurysm, subcapsular hematoma, etc.

B. Abdominal CT can be used for follow-up imaging and may allow for earlier return to sports activities. [Adapted from WSES]

C. If a new pseudoaneurysm is noted on follow-up imaging, discussion with general surgery is recommended to determine best management, e.g., serial imaging vs. embolization.