REVIEW

Splenomegaly: Investigation, diagnosis and management

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Keywords:
Spleen
Splenomegaly
Spleen radiology
Splenic biopsy
Diagnostic splenectomy

Summary

Splenomegaly is a feature of a broad range of diseases, and presents to clinicians in many fields. This review examines the aetiology of splenomegaly in the developed world, and describes a logical approach to the patient with splenomegaly. In some patients, extensive radiological and laboratory investigations will fail to yield a diagnosis: these cases of “isolated” splenomegaly are not uncommon and can be particularly challenging to manage. The risks of serious underlying disease must be balanced against the risks of invasive investigations such as splenic biopsy and diagnostic splenectomy. We discuss the options in isolated splenomegaly and their evidence base, and incorporate them into a management strategy to aid the clinician in cases of diagnostic difficulty.

Introduction

The patient with splenomegaly can present as a diagnostic challenge to a wide variety of clinicians. The list of conditions associated with splenomegaly is extensive, and as noted by William Osler in 1908, “nearly all diseases of the spleen are of a secondary nature”. A patient presenting with splenomegaly may therefore have a collection of symptoms, signs and test results that are common to various diseases: some benign and self-limiting, some infective and others malignant. The clinician must adopt a systematic approach to identify serious disease, whilst minimising unnecessary investigations and anxiety for the patient. A century after Osler, this review examines the tools that are available in this diagnostic pathway, and suggests a safe management strategy for those challengesing patients with isolated splenomegaly.

Defining splenomegaly

The “gold-standard” definition of splenomegaly is splenic weight: the normal adult spleen weighs about 50–250 g, and this decreases with age. This can only be established at splenectomy or post mortem examination, and it is surprisingly difficult to establish a practical clinical definition of splenomegaly.

The clinical finding of a palpable spleen was previously considered to be evidence of splenic enlargement, but up to 16% of palpable spleens have been found to be of normal size on radiological assessment. While clinical examination can be convincing in massive splenic enlargement, radiology is often needed to confirm the diagnosis. A single radiological definition of normal splenic size has not been adopted, and the assessment is often partly subjective.

On ultrasound examination, “craniocaudal length” is used most often to measure splenic size; this correlates well with splenic volume, particularly when the right lateral decubitus position is adopted. However, the quoted upper limit of normal varies from 11 to 14 cm. Other ultrasonographic indicators of splenomegaly include an anteroposterior measure greater than two thirds of the distance between the anterior and posterior abdominal wall, or complex formulae can be used to estimate splenic volume. With CT examination, splenic length, the “splenic index” (product of length, depth and width) and the sum of volumes of consecutive scan slices have all been used. Radiological confirmation of splenomegaly may therefore depend both on the radiologist’s preferred method and a degree of subjective judgement. A maximum length of 13 cm is a typical limit.

Aetiology and epidemiology of splenomegaly

The conditions associated with splenomegaly are shown in Table 1. There is limited recent information from developed countries on its epidemiology. Looking at unselected healthy populations, the prevalence of a palpable spleen in college freshmen was found to be 2.9% in 1966; none of these subjects developed malignant disease at follow-up of 10 years. Prospective studies in unselected medical outpatients found palpable spleens in 2–5.6% of patients, with an unknown aetiology after basic investigations in 25–41% of cases. In many of these patients splenomegaly was not confirmed radiologically. More recent small studies describe...
asymptomatic young men in whom significant, persistent splenomegaly was detected on clinical and radiological examination, with normal investigations including bone marrow, liver and rectal biopsies. Since many of these patients remained well for over 10 years, there does seem to be a group of individuals with benign splenomegaly, but the prevalence is not clear.

The frequency and causes of splenomegaly have now been studied retrospectively in US hospital inpatients. The estimated incidence from 1963 to 1995 was 0.3% of admissions and a diagnosis was reached in 98%, but 12% required a diagnostic splenectomy. Of all patients with splenomegaly, haematological disease was found in 16–66%, hepatic disease in 9–41%, infectious disease in 9–36%, congestive or inflammatory disease in 4–10% and primary splenic disease (e.g. storage disease) in 1–6%. Within the haematological disorders, the most common diagnoses were lymphoma (16–44% of all splenomegaly), CML (8–29%), haemoglobinopathy (7–25%), CLL (0–20%) and myelofibrosis (9–16%).

The causes of splenomegaly vary between hospitals in the same country, but differences between developing and developed countries are even more striking. 11–45% of massive splenomegaly in Africa is due to Tropical Splenomegaly Syndrome of malarial origin, and up to 30% is due to schistosomiasis.

### Assessment of the patient with splenomegaly

Clinical assessment begins with a thorough history and examination. The history may elicit symptoms of pressure effects from the enlarged spleen, such as left hypochondrial discomfort or early satiety. There may be symptoms of cytopenias due to hypersplenism: a syndrome comprising splenomegaly; anaemia, leucopenia and/or thrombocytopenia; compensatory bone marrow hyperplasia; and improvement after splenectomy (if performed). General systemic symptoms such as fever, sweats, weight loss or lymphadenopathy suggest haematological, malignant, infectious or inflammatory disease. A thorough systemic enquiry is essential to recognise multi-system disorders such as the collagen diseases and sarcoidosis. The past medical history may suggest the cause of splenomegaly, though further investigations will be indicated if the presentation is unusual (e.g. massive splenomegaly in a patient with mild congestive cardiac failure). A family history should be carefully elicited, such as of malignancy or anaemia, while remembering that individuals with autosomal recessive conditions like Gaucher’s disease often have no affected family members. Risk factors should be identified for liver disease, particularly alcohol intake, and for infectious diseases (travel, sexual contacts, intravenous drug use, exposure to animals and predisposition to infective endocarditis).

Physical examination will typically confirm palpable splenomegaly, depending on the degree of enlargement and body habitus. General examination may reveal fever, lymphadenopathy, anaemia, signs of hepatic or inflammatory disease, stigmata of endocarditis, or involvement of any other organ system. The difficulty with splenomegaly is that many signs and symptoms that may be elicited are common to various conditions. Most patients require at least preliminary laboratory and radiological investigations, as shown in Table 2. This list is not exhaustive, and additional investigations may be indicated by specific clinical findings.

Even if initial assessment does not identify the cause of splenomegaly, certain parameters may narrow the differential diagnosis. In studies of inpatients with splenomegaly, haematological diseases were positively associated with lymphadenopathy, massive splenomegaly and “cytoses” (erythrocytosis, leucocytosis, thrombocytosis, marked left shift of the neutrophilic leucocytes or marked reticulocytosis). 84% of cases with progressive splenic enlargement were associated with haematological disease, predominantly malignancy. Infectious diseases showed positive associations with fever, and hepatic diseases with abnormal liver function tests.

### Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Groups</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematological</td>
<td>Myeloproliferative</td>
<td>Myeloproliferosis, chronic myeloid leukaemia (CML), polychaema vera, essential thrombocytosis</td>
</tr>
<tr>
<td></td>
<td>Lymphoma</td>
<td>Non-Hodgkin lymphoma (NHL), Hodgkin lymphoma</td>
</tr>
<tr>
<td></td>
<td>Leukaemia</td>
<td>Acute leukaemia, chronic lymphocytic leukaemia (CLL), haery cell leukaemia, prolymphocytic leukaemia</td>
</tr>
<tr>
<td></td>
<td>Congenital</td>
<td>Hereditary spherocytosis, thalassaemia, HbSC disease</td>
</tr>
<tr>
<td>Congestive</td>
<td></td>
<td>Cirrhosis, splenic portal/haptic vein thrombosis or obstruction, congestive cardiac failure</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>Diseases</td>
<td>Systemic lupus erythematous, rheumatoid arthritis (Felty’s)</td>
</tr>
<tr>
<td>Granulomatous</td>
<td></td>
<td>Sarcoiosis</td>
</tr>
<tr>
<td>Neoplastic</td>
<td></td>
<td>Haemangiomata, metastases (lung/breast carcinoma, melanoma)</td>
</tr>
<tr>
<td>Infiltrative</td>
<td></td>
<td>Gaucher’s disease, amyloidosis</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>Cysts</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>In most patients</th>
<th>In selected patients (depending on clinical features)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematology</td>
<td></td>
</tr>
<tr>
<td>Full blood count</td>
<td>Direct antiglobulin test</td>
</tr>
<tr>
<td>Peripheral blood film</td>
<td>Reticulocyte count</td>
</tr>
<tr>
<td>ESR</td>
<td>Malaria blood film</td>
</tr>
<tr>
<td>Clotting screen</td>
<td>Haemoglobin electrophoresis/HPLC</td>
</tr>
<tr>
<td>Biochemistry</td>
<td></td>
</tr>
<tr>
<td>Urea and electrolytes</td>
<td>Serum ACE</td>
</tr>
<tr>
<td>Liver function tests</td>
<td>Serum protein electrophoresis</td>
</tr>
<tr>
<td>C-reactive protein</td>
<td>Urine Bence Jones protein</td>
</tr>
<tr>
<td>Bone biochemistry</td>
<td>Serum LDH</td>
</tr>
<tr>
<td>Vitamin B12, red cell folate</td>
<td></td>
</tr>
<tr>
<td>Microbiology</td>
<td></td>
</tr>
<tr>
<td>Monospot test</td>
<td>Peripheral blood cultures</td>
</tr>
<tr>
<td>Serology: hepatitis B/C</td>
<td>Sputum microscopy, culture and AAFB</td>
</tr>
<tr>
<td>Mantoux test</td>
<td>Serology: HIV, CMV, toplasmolysis, brucella</td>
</tr>
<tr>
<td>Immunology</td>
<td></td>
</tr>
<tr>
<td>Auto-antibodies incl. ANA</td>
<td></td>
</tr>
<tr>
<td>Rheumatoid factor</td>
<td></td>
</tr>
<tr>
<td>Radiology</td>
<td></td>
</tr>
<tr>
<td>Ultrasound/CT abdomen</td>
<td>Ultrasound abdomen with duplex-Doppler studies</td>
</tr>
<tr>
<td>Plain chest radiograph</td>
<td>CT chest, abdomen and pelvis</td>
</tr>
<tr>
<td>Bedside</td>
<td></td>
</tr>
<tr>
<td>Urine dipstick (protein, blood)</td>
<td></td>
</tr>
</tbody>
</table>

ESR: erythrocyte sedimentation rate; HPLC: high-performance liquid chromatography; LDH: lactate dehydrogenase; ACE: angiotensin-converting enzyme; AAFB: acid and alcohol-fast bacilli; and ANA: anti-nuclear antibodies.
function tests, hepatomegaly, and thrombocytopenia or leuco-
penia. All patients with the combination of splenomegaly and
lymphadenopathy had serious associated diseases, most often
haematological malignancy. While none of the associations are so
specific that other diagnoses can be excluded, these features may
nonetheless contribute to the clinician's overall diagnostic
impression.

Radiology of the spleen

Radiology has four major roles in the investigation of spleno-
megaly: confirmation of splenic size; evaluation of splenic archi-
tecture; assessment of other organs affecting the differential
diagnosis; and in certain patients, radiologically-guided biopsy.

Even in palpable splenomegaly, radiological assessment is usu-
ally necessary to quantitate the abnormality, as discussed above.
The main modalities used are ultrasound and CT (Fig. 1). Imaging
also delineates the architecture of the enlarged spleen, and distin-
guishes between focal lesions, either single or multiple, and diffuse
splenomegaly. Focal lesions may be neoplastic (lymphoma, metas-
tasis, other tumours); infective (bacterial abscess, tuberculosis,
histoplasmosis, fungal); vascular (haematoma, angioma); granu-
ulomatous (sarcoidosis) or cysts. In some conditions, clinical fea-
tures and initial imaging will establish the diagnosis (e.g. a
history of trauma and haematoma), but imaging findings specific
to a single disease are uncommon. In the context of focal lesions
for example, differentiation of malignant tumours from benign
lesions can be impossible. Most commonly the spleen is dif-
sely enlarged, and specific findings must be sought elsewhere.

Important information is also gained from the characteristics of
other tissues, and this will frequently dictate the imaging modality
used. In liver disease, ultrasound will not only demonstrate hepatic
echogenicity, but the use of duplex-Doppler parameters can iden-
tify congestive splenomegaly. In malignant disease, CT is usually
essential to identify enlarged lymph nodes, primary tumours or
other metastases. Sarcoidosis, tuberculosis and other inflammatory
disorders may also be suggested by patterns of multi-system
involvement. Magnetic resonance imaging is used infrequently,
but can be valuable for certain focal and diffuse abnormalities. For
example, about 10% of patients with portal hypertension have
spleenic Gamma Gandy bodies on T2-weighted MRI.

In summary, the first-line choice of imaging modality varies be-
tween patients. Ultrasound is portable and does not involve ionis-
ing radiation. It will confirm the presence of splenomegaly,


Fig. 1. The use of CT in splenomegaly. (a) Contrast-enhanced axial CT image in a patient with hairy cell leukaemia. There is massive splenomegaly with antero-medial
displacement of the left kidney. (b) Contrast-enhanced axial CT image in the venous phase. There is poor enhancement of the peripheral liver and a filling defect in the IVC
(arrow). Contrast enhancement of the caudate lobe is preserved due to separate, direct drainage into the IVC. This is Budd–Chiari syndrome, one of the few causes of
splenomegaly that has diagnostic imaging appearances.

Second-line investigations

In some patients, clinical assessment and/or first-line investiga-
tions will either reveal the diagnosis or direct subsequent diagnos-
tic tests. For example, a peripheral blood film suggestive of
myeloproliferative disease prompts a bone marrow biopsy and
testing for the JAK2 V617F mutation. Immunophenotyping of
abnormal peripheral blood cells confirms the diagnosis of some
acute and chronic leukaemias. Identification of lymphadenopathy
can be followed by biopsy, particularly where clinical features
favour malignancy over self-limiting infection.

In those in whom findings from the initial assessment are non-
specific, the clinician must decide how intensively to investigate
further. In most patients (except those who are young and asympto-
tomatic with mild splenomegaly and no other findings), a bone
marrow aspiration and trephine is a reasonable second-line inves-
tigation. This can reveal myeloproliferative or lymphoproliferative
disorders, infectious or inflammatory disease such as tuberculosis,
leishmaniasis and sarcoidosis. Liver biopsy can be considered if he-
patic lesions are identified, if liver function tests are very abnormal,
or if granulomatous disease is suspected.

The patient with splenomegaly sometimes remains undiag-
nosed despite undergoing the above. We will refer to such patients
as having "isolated splenomegaly", although other investigations
may not be entirely normal (for example, there may be cytopenas
or abnormal liver function tests). The management of these
patients is considered in the remainder of this review.

The aetiology of isolated splenomegaly

Retrospective reviews of patients who have undergone diagno-
sic splenectomy are most informative in the aetiology of isolated
splenomegaly. As these patients were felt to warrant diagnostic
splenectomy, they are quite a different group from the asymptom-
atic young men with splenomegaly detected at routine examina-
tions previously described. Table 3 shows the variable
proportion of patients found to have haematological malignancy
at diagnostic splenectomy: 0–80%. These patients had under-
gone extensive conventional investigations, including bone mar-
row biopsy and sometimes liver biopsy. Other common
diagnoses included “congestive” splenomegaly, sarcoidosis and splenic cysts.

Most early studies described patients in whom no diagnosis was made at splenectomy. Dacie et al. followed up 10 such patients with neutropenia, thrombocytopenia, anaemia and gross splenic enlargement, in whom splenic histology showed no evidence of overt lymphoma. Nine years later, four had developed malignant lymphomas, while the others showed no related disease.26 In contrast, other studies of similar patients found that very few developed lymphoma, with up to 60% remaining healthy after splenectomy and prolonged follow-up.21 This particularly applied to young patients (mean age 28 years), who had mild cytopenias but were asymptomatic, and often had a recent history of infection.

There are a few recent reports of the findings in unselected patients undergoing diagnostic splenectomy.22–25 These show more clearly the types of haematological malignancy found. In a study of 122 patients, the commonest diagnoses were marginal zone lymphoma (17% of diagnostic splenectomies for splenomegaly); large B-cell lymphoma (10% of splenectomies for splenomegaly; 29% of splenectomies for splenic mass); and follicular lymphoma (2% of splenomegaly).23 Compared to earlier series, those from the last decade have much lower rates of splenectomy failing to yield a diagnosis: 0–5%.23–25 The difference could be interpreted as suggesting that most of the earlier “non-diagnostic” splenectomies would have a diagnosis made by modern histological and/or molecular techniques. Some could have had a lymphoma that was not detected histologically, with a long remission induced by splenectomy as a therapeutic procedure.24 However, indications for splenectomy have changed over time, and many of the “non-diagnostic” procedures performed previously may now not be performed at all (if patients are young and asymptomatic, for example).21,24

In summary, while there is a significant rate of identifying lymphoma at diagnostic splenectomy, many patients presenting with isolated splenomegaly and non-diagnostic preliminary investigations will not have malignancy. Other factors must guide subsequent management, for which there are three principal options: watchful waiting, splenic biopsy and diagnostic splenectomy.

**“Watch and wait” strategy**

There is unfortunately little evidence indicating what factors suggest benign self-limiting disease, or “idiopathic” splenomegaly. In early studies of diagnostic splenectomy, no clinical or laboratory findings predicted which patients would have lymphoma rather than idiopathic splenomegaly.27 Generally, young asymptomatic patients with a recent history of infection had no serious disease at splenectomy or follow-up, even in the presence of mild cytopenias.21 In more recent studies reporting higher rates of lymphoma, all patients were symptomatic prior to splenectomy.24 It is also important to note that while some patients with isolated splenomegaly will have a low-grade lymphoproliferative disorder, in many cases no treatment would be indicated unless the patient is symptomatic.

Patients in whom it may be reasonable to adopt a watch and wait strategy include those who are young, with mild splenomegaly. They should be well with no constitutional symptoms such as fever, weight loss or night sweats, unless these are of short duration and there is a strong suspicion of acute viral illness. There should be no symptoms suggesting disease in other systems such as the chest or gut. Lymphadenopathy should be minimal, unless biopsy has shown convincing reactive histology. The blood count could be normal, with very mild cytopenias, mild neutrophilia or thrombocytosis with a reactive blood film picture, or a polyclonal lymphocytosis. In these selected patients it may be appropriate to monitor the patient and the spleen size over the course of weeks to months.

If there is progressive splenic enlargement, new symptoms or clinical signs, or progressive blood count abnormalities, then the patient should be reassessed. Preliminary investigations should be repeated, and if the diagnosis remains unclear the abnormal spleen may need direct assessment. The options here are splenic biopsy and diagnostic splenectomy.

### Splenic biopsy

Two techniques have been described for biopsy of the spleen: fine-needle aspiration (FNA) and core biopsy. Splenic FNA was first reported in 1916 in the diagnosis of leishmaniasis, and has now been used in the staging of malignancy.28,29 in the evaluation of focal splenic lesions and diffuse splenomegaly.15,30–34 It can diagnose infectious diseases such as tuberculosis, malaria, and fungal infections, and non-infectious diseases including sarcoidosis, amyloidosis and storage disorders.30,31 Overall the procedure seems safe, many studies reporting no complications.15,28,32,33 Others have described transient pain in up to 10%, bleeding (1–3% in large studies), and occasional pneumothorax and need for splenectomy.29,34

Sensitivity and specificity rates of splenic FNA are not frequently reported because limited numbers of patients undergo a further biopsy, diagnostic splenectomy or post mortem examination to establish whether the correct diagnosis was made on FNA. A study in which 21 cases had subsequent histological confirmation found a sensitivity of 68.8% and specificity of 100%; another series of 78 patients reported rates of 86.4% and 97.5%, respectively.32,34 However, there is considerable heterogeneity between studies in the types of lesion biopsied, and in whether the patients studied had a pre-existing malignant diagnosis; other studies do not specify this information. These factors have a significant impact on the clinical utility of splenic FNA, which therefore varies widely: for example, rates of biopsies being inadequate for diagnosis vary from 1.3% to 34% in published series.28,30 Overall, splenic FNA seems most useful in patients with focal splenic lesions, where malignancy can often be distinguished from benign disease,28 but much less helpful in the investigation of undiagnosed diffuse splenomegaly.31

The problem of false-negative results is greatest in the diagnosis of NHL and Hodgkin lymphoma; indeed, the question of whether lymphoma can be reliably diagnosed on FNA has been debated before, typically in relation to lymph nodes.15,36 Sampling error or the co-existence of benign and malignant cells can cause confusion between reactive and neoplastic lesions. If sufficient material is obtained, immunophenotyping by flow cytometry and immunocytochemistry can be employed; these techniques have

### Table 3

Findings at diagnostic splenectomy for splenomegaly.

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>% Haematological malignancy</th>
<th>% Non-diagnostic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hermann et al.19</td>
<td>52</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Gomewerdane et al.20</td>
<td>13</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>Krudson et al.21</td>
<td>28</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>Cronin et al.22</td>
<td>10</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Kraus et al.23</td>
<td>122</td>
<td>59 for “splenomegaly”</td>
<td>5</td>
</tr>
<tr>
<td>Carr et al.24</td>
<td>18</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Pottak et al.25</td>
<td>41</td>
<td>37</td>
<td>0</td>
</tr>
</tbody>
</table>

Study from India. Tuberculosis in 12%
improved the discrimination between different histological subtypes of lymphoma with splenic FNA. However, FNA is still unreliable in the diagnosis of Hodgkin lymphoma and T-cell lymphomas, in grading follicular NHL, and in differentiating transformation of follicular lymphoma from diffuse large B-cell lymphoma.

These limitations are illustrated by a recent study of 156 splenic biopsies (83.9% FNA alone; others had an additional core biopsy). Seventeen patients had false-negative findings, of which 13 had lymphoma. The accuracy of FNA for diagnosing NHL was 84%, but only 69% of lymphomas could be subclassified despite flow cytometry, surface marker studies and immunostaining. The sensitivity for diagnosing Hodgkin lymphoma was 50%.

Overall, while FNA can suggest and sometimes confirm a diagnosis, a negative result clearly does not exclude pathology. Any non-diagnostic, suspicious or negative biopsy should be followed by another diagnostic procedure, particularly if there is a clinical suspicion of lymphoma.

Splenic core biopsy has been used more recently. The technique was described in 1985 in 32 patients who required staging of lymphoma, investigation of systemic symptoms or splenomegaly. Bleeding was a complication in four patients (12.5%), requiring splenectomy in one, with slight or moderate pain in 50%. Smaller needles have been used since, and while bleeding is reported in up to 10% in some recent series, many others report no complications. An Italian multi-centre review of 398 splenic biopsies found no difference in complication rates between core and FNA biopsies. Core biopsy has been used to diagnose a wide range of infectious, benign and malignant conditions (Fig. 2). Specimens are adequate for diagnosis in up to 90%, often with a 3.2% incidence of infection and 1.4% mortality rate. These limitations are illustrated by a recent study of 156 splenic biopsies (83.9% FNA alone; others had an additional core biopsy). Seventeen patients had false-negative findings, of which 13 had lymphoma. The accuracy of FNA for diagnosing NHL was 84%, but only 69% of lymphomas could be subclassified despite flow cytometry, surface marker studies and immunostaining. The sensitivity for diagnosing Hodgkin lymphoma was 50%.

When considering the place of core biopsy in the investigation of isolated splenomegaly, the studies share many limitations with those of FNA: patient numbers are small, many look at focal splenic lesions rather than splenomegaly, and many patients already have a malignant diagnosis. Overall, both techniques represent a safe option for patients with isolated splenomegaly who require a diagnosis, potentially avoiding diagnostic splenectomy. Experience with core biopsy is more limited, but it has advantages if lymphoma is suspected.

**Diagnostic splenectomy**

The yield of diagnostic splenectomy has been discussed above. The use of this procedure has declined as other modalities of diagnosis have improved, and there are consequently very few recent data on complication rates specific to diagnostic surgery. One recent study from India reported a 41% incidence of postoperative complications and 2.4% mortality. Elective splenectomy is now most often performed therapeutically for non-malignant disease, but splenectomy in the context of splenomegaly has traditionally been considered a riskier procedure. Early studies of splenectomy for massive splenomegaly demonstrated complication rates of up to 56% and mortality rates up to 14.7%. A retrospective review of 135 splenectomies for haematological malignancy in 1996 found a complication rate of 63% for patients with spleens weighing more than 2000 g, and 29% for those less than 2000 g.

Recent studies report more positive outcomes. Laparoscopic splenectomy was previously contraindicated in splenomegaly, but its use is now widespread and associated with lower morbidity, transfusion rate and shorter hospital stay than open splenectomy. When compared to laparoscopic splenectomy for normal-sized spleens, some studies have found no difference in transfusion rate, length of stay, severe morbidity or rate of conversion to open splenectomy for enlarged spleens, although accessory incisions are needed more frequently. “Massive” splenomegaly has been associated with increased morbidity: a study in 2003 found that spleenic weights over 1000 g were associated with significantly longer postoperative stays, higher conversion rates, and a 14-fold greater risk of postoperative complications. Nonetheless, others describe increasing success with laparoscopic splenectomy in this situation, with the conversion rate falling from 33% prior to 1999 to 0% in 2004 and 2005, and no reoperations or mortality. This also reflects introduction of the hand-assisted laparoscopic splenectomy (HALS) technique, which facilitates mobilisation and removal of the spleen without morcellation (particularly important in diagnostic splenectomy).

In recent studies specific to splenectomy with splenomegaly, complication rates of 6–22% and minimal perioperative mortality have been reported. There are few data concerning long-term follow-up, and since splenectomy carries a risk of infection, this is important when considering diagnostic splenectomy in a previously healthy individual. In 1996 a review of 6942 patients, with a median follow-up of 6.9 years after splenectomy for any indication, found a 3.2% incidence of infection and 1.4% mortality rate. These rates have fallen over time because of vaccination and prophylactic antibiotic regimes, and a more recent study of splenectomy for immune thrombocytopenic purpura identified no life-threatening infections after 434 patient-years of follow-up.

It is worth considering whether splenectomy could bring benefits other than reaching a diagnosis. Splenectomy reverses the cytopenias associated with hypersplenism, regardless of underlying cause. In haematological disease, splenectomy has also been used for palliation in symptomatic massive splenomegaly, and to induce remission in primary splenic lymphoma. However, improved diagnostic and chemotherapeutic strategies have re-
duced its use in lymphoma staging and treatment of diseases such as hairy cell leukaemia. The number of patients in whom the benefits of a diagnostic splenectomy truly outweigh the risks is relatively small. The procedure should only be considered in those in whom splenic biopsy is contraindicated or non-diagnostic and in whom a diagnosis is essential, especially in the presence of severe symptoms or cytopenias.

Conclusions

It is difficult to establish an evidence-based management strategy for the patient with splenomegaly, but certain conclusions are clear. The finding of splenomegaly should always be taken seriously. The procedure should only be considered in those in whom a diagnosis is essential, especially in the presence of severe symptoms or cytopenias.

Practice points

The evaluation of splenomegaly hinges on a comprehensive clinical assessment, which guides the intensity of subsequent investigations. Isolated splenomegaly can be associated with malignancy, but many patients develop no serious disease after long-term follow-up and watchful waiting is often appropriate. Splenic biopsy is a safe, effective procedure for patients who require a diagnosis despite first- and second-line investigations. Diagnostic splenectomy carries more risk and should only be considered in patients with significant symptoms and/or hypersplenism.

Conflicts of interest statement

None declared.

References