Splenic Abscess: An Easily Overlooked Disease?

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Splenic abscess is an uncommon but potentially life-threatening disease. Recent advances in radiology have affected the diagnosis and management of this disease entity. The purpose of this study was to review our experience in managing these patients. We retrospectively reviewed the medical records of 51 patients with splenic abscess as seen in a tertiary medical center between 1998 and 2003. We analyzed the demographics, clinical manifestations, etiology, predisposing factors, diagnostic modalities, bacteriologic profile, treatment, and outcome of these patients. The mean age was 59.9 ± 14.2 years (ranging from 21–89 years). The male:female ratio was 29:22. Common symptoms included fever (82%), abdominal pain (71%), and nausea and vomiting (46%). The majority of these patients (83%) had leukocytosis. Thirty-six patients had associated parenchymal liver diseases and 26 patients had diabetes mellitus. Abdominal sonogram or computed tomography was performed to establish the diagnosis. Most cultures from the abscess cavities grew gram-negative enteric bacilli. Patients were treated with antimicrobial therapy only (n = 33), additional percutaneous drainage with a pigtail catheter (n = 11), or splenectomy (n = 7), and the survival rates were 48 per cent, 45 per cent, and 100 per cent, respectively. Splenic abscess should be considered in a patient with fever, left upper abdominal pain, and leukocytosis. Splenectomy appears to have better treatment outcome than percutaneous drainage or intravenous antibiotics alone.

SPLENIC ABSCESS IS an uncommon but potentially fatal disease. The incidence of splenic abscesses ranges from 0.2 to 0.7 per cent in various autopsy series, and it appears to be increasing in frequency.[1, 2] Splenic abscess may result from bacteremia, direct extension from a neighboring infectious process, arterial embolic process, abdominal trauma, and immunosuppressive states. Once the diagnosis of splenic abscess is delayed, sepsis and even the patient's demise may occur. However, the presentation of this disease is often vague, nonspecific, and insidious, which may include fever, abdominal pain, weight loss to rigor, and asthenia.[2] The clinical examination may show left upper quadrant tenderness, leukocytosis, and pleural effusion on the chest X-ray. In addition to the difficulty in establishing a diagnosis, the treatment of splenic abscess is also quite variable. Splenectomy has long been considered to be the treatment of choice.[3] Recent advances in radiology have demonstrated that percutaneous drainage of splenic abscess can be used in selective patients with good results.[4, 5] The purpose of this study was to review our experience in the care of these patients. We specifically examined the presenting symptoms and signs, diagnostic modalities, and treatment outcome to develop useful guidelines in caring for these patients.

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Patients and Methods

This is a retrospective study on all patients with splenic abscess seen at Chang-Gung Memorial Hospital, Kaohsiung, between 1998 and 2003. The medical record of each patient was reviewed. Data extracted for analysis included age, sex, symptoms, signs, predisposing conditions, bacteriologic profile, treatment type, and outcome of treatment.

The clinical manifestation according to each patient's initial symptoms was tabulated. Systemic diseases extracted from the medical records included diabetes mellitus, hypertension, benign or malignant liver disease, benign or malignant pancreatic disease, recent abdominal trauma, immunosuppressive state, or endocarditis.

The diagnosis of splenic abscess was established with abdominal sonogram or computed tomography (CT) of the abdomen. Solitary and multiple lesions were categorized by the imaging studies. Patients then underwent the percutaneous needle aspiration of the abscess content. Bacteriologic profile from the abscess

cavities was determined. In addition, for patients who underwent splenectomy, intraoperative cultures of the splenic abscess were also performed. Treatment modalities of splenic abscess were categorized into three groups: intravenous antibiotics alone, antibiotics with percutaneous drainage of abscess cavities, and antibiotics with splenectomy. Duration, complications, and mortality among patients in each group were compared.

All data are expressed as mean ± SD. The comparison of means from multiple groups was analyzed by one-way analysis of variance followed by Dunnett's multiple comparison tests. Statistical significance was determined at $P < 0.05$.

Results

There was a total 51 patients seen during the study period. The mean age was 59.9 ± 14.2 years, ranging between 21 and 89 years. The male:female ratio was 29:22. The first three most common symptoms on presentation were fever (82%), abdominal pain (71%), and nausea and vomiting (46%). The average duration of symptoms to the time of diagnosis was 15 days, with a range of 8 to 21 days. The majority of patients (83%) in our series had leukocytosis (white blood cells [WBC] > 10 K/mm^3; Table 1).

There were 36 patients (70.6%) who had associated liver parenchymal diseases, including 23 patients with hepatoma and 20 of them received transcatheter arterial embolization of the liver. Eleven patients (21.5%) had pancreatic diseases, including seven with pancreatitis and four with malignancies. Splenic abscess developed in thee trauma patients: two had exploratory celiotomy and the third patient was managed nonoperatively. Diabetes mellitus was a common comorbidity and was seen in 26 (51%) patients (Table 1).

Thirty-nine patients had abdominal sonographic examination. Nine of them required additional abdominal CT to confirm the diagnosis. CT of the abdomen was the sole examination in 12 patients. Solitary splenic abscesses were seen in 15 patients. Thirty six patients had multiple abscess cavities in the spleen. Cultures from splenic abscesses in nine patients grew polymicrobial infection. In contrast, cultures from 38 patients only grew single organism. Four patients had negative cultures from abscess cavities (Table 2).

Thirty-three patients received parenteral antibiotics as the sole treatment for the splenic abscess (Group 1). Twelve patients presented with a single abscess cavity, and 21 patients presented with multiple abscesses. There was no difference in the success rate of treatment between single abscess group and multiple abscesses group (5/12 *vs* 9/21, $P > 0.05$). The presence of a polymicrobial culture did not affect the treatment success rate. The average duration of the antimicrobial therapy among survivors in Group 1 was 46 days (range, 27–66 days).

Eleven patients had additional percutaneous drainage with pigtail-like catheters (Group 2). The average duration of the successful percutaneous drainage therapy was 31 days (range, 15–45 days). Of eight patients with multiple splenic abscesses who were treated with percutaneous drainage, six died. There were seven patients who underwent splenectomy (Group 3). The mean age was significantly younger compared with the other two groups ($P < 0.05$). All had multiple splenic abscesses; one patient developed acute peritonitis because of the abscess rupture. Patients survived the operation and were discharged from the hospital in improved condition. The average postoperative course was 11 days (range, 8–21 days). The overall survival rates among three groups of patients were 48 per cent, 45 per cent, and 100 per cent, respectively (Table 3).

TABLE 1. *Patient Characteristics*

Characteristic	Mean ± SD
Age (years)	59.9 ± 14.22 (range, 21–89)
M/F ratio	29:22
Presenting symptoms or signs	
Fever (temperature > 38°C)	42 (82%)
Abdoinal pain	36 (71%)
Nausea and vomiting	23 (46%)
Leukocytosis (WBC > 10 K/mm^3)	42 (83%)
Predisposing factors	
Parenchymal liver disease	36 (71%)
Diabetes mellitus	26 (51%)
Pancreatic disease	11 (22%)
Abdominal trauma	3 (6%)
Immunosuppression	3 (6%)
Endocarditis	2 (4%)
Empyema	2 (4%)

TABLE 2. *Bacteriologic Findings of Abscess Cultures*

Organism	Number of Patients
Klebsiella neumonia	18
Bacteroides fragilis	4
Escherichia coli	11
Staphylococcus aureus	5
Pseudomonas aeruginosa	10
Samonella choleruesuis	3
Streptococcus pneumonia	8
Mycobacteria tuberculosis	1
Fugus	2
Cadiobacterium hominis	1
Baccilus cereus	1
Monomicrobial	38
Polymicrobial	9
Fungal	2
No growth	4

TABLE 3. *The Comparison of Three Treatment Modalities*

Treatment Groups	n	Age (years)	Abscess Cavities (S/M)*	Survival Rate (%)
Antibiotics alone (Group 1)	33	63.67 ± 10.65	12/21	16/33 (48%)
Percutaneous drainage (Group 2)	11	62.91 ± 13.64	3/8	5/11 (45%)
Splenectomy (Group 3)	7	37.14 ± 10.76†	0/7	0/7 (100%)†

* S/M: solitary *versus* multiple abscesses.
† $P < 0.05$ *vs* Groups 1 or 2.

Discussion

Splenic abscess that has historically been considered as an uncommon disease is recently being reported with increased frequency. Two main contributing factors to the apparent increase in the incidence of splenic abscess are the advances of imaging studies and a greater number of patients who have cancers or are immunocompromised.[6, 7] Additionally, other related conditions include splenic trauma in which the splenic abscess develops weeks or months later,[2] metastatic hematogenous infections, and contiguous sites of infection have also been shown to be predisposing causes. In our study, 23 patients had hepatoma and 20 of them underwent transcatheter arterial chemoembolization (TAE). The development of abscess formation in the liver or the subphrenic space is a known complication of the TAE.[8, 9] The incidence has been reported to be less than 2 per cent.[10, 11] Chen et al.[12] have identified advanced age, previous biliary tract disease, and large tumor size as risk factors of developing liver abscesses. Here, we have shown that splenic abscess could also develop in patients after TAE. However, the symptoms and signs developed after chemoembolization were not specific and the diagnosis of abscess was frequently delayed, which caused significant morbidity and mortality. Therefore, in patients who developed fever and abdominal pain after TAE, the liberal use of abdominal CT may be quite valuable in the diagnosis and treatment.

Fever is the most common symptom seen in our patients, followed by abdominal pain and nausea and vomiting. The triad of fever, left upper quadrant pain, and a tender mass was suggested by Sarr and Zuidema[13] as the presenting complex of splenic abscess. We could not appreciate the presence of a tender mass on physical examination in the majority of our patients. Leukocytosis (WBC > 10 K/mm^3) is the most common abnormal laboratory finding. The diagnosis of splenic abscess required imaging studies. Ultrasonography was commonly used to examine the abdomen. However, there were nine patients in our study who required an additional CT of the abdomen to confirm the diagnosis of splenic abscess. Abdominal CT offers an additional advantage to better evaluate the contagious infectious source(s) than the ultrasonography.

Enteric gram-negative bacteria were cultured from the abscess cavities in over two-thirds of patients. Nine patients had multiple bacteria grown from the abscess cavity. These findings are not surprising because the majority of our patients had contiguous infections in the abdomen. Thirty-three patients received parenteral antibiotics as the sole treatment for the splenic abscess and 17 of them died. The cause of death was from overwhelming infection or organ failure. The average duration of the antibiotic treatment among survivors was 46 days with a range of 27 to 66 days. The success rate of antibiotic therapy was not affected by the presence of multiple abscesses or a polymicrobial culture from the abscess cavities.

Percutaneous drainage has recently been considered as an acceptable treatment for splenic abscess in selective patients.[4, 5] The success rates of percutaneous drainage are reported to range between 67 per cent and 100 per cent. It offers theoretical advantages to preserve the proper immunologic function, to spare patients who are usually septic, severely ill, and at high surgical risk from surgery and anesthesia, and to avoid the danger of overwhelming postsplenectomy infections. It also allows the patient to improve his medical condition before a definitive elective surgical therapy is contemplated. The procedure is most likely to be successful when the abscess collection is unilocular or bilocular and when its content is liquefied enough to be drained.[14, 15] However, multilocular abscesses with thick septations or necrotic debris, or poorly defined cavities, or multiple small deep cavities are less amenable to percutaneous drainage. In our study, 11 patients had additional percutaneous drainage of the splenic abscess(es) with the guidance of CT (9 patients) or abdominal ultrasonography (2 patients). Three patients with a single abscess were successfully managed with percutaneous drainage.[7, 16] In comparison, multiple abscess cavities were drained in eight patients; six of them died. These findings seem to suggest that percutaneous drainage is not effective in treating patients with multiple splenic abscesses.

Splenectomy has long been considered the standard treatment for these patients.[17] However, patients with splenic abscess are frequently quite ill and have serious underlying medical conditions with inadequate physiologic reserves. The mortality from the procedure in these patients can be quite high. Paris et al.[17] showed that two of their seven splenectomy patients died postoperatively. In our study, seven patients who underwent splenectomy survived the procedure and were discharged. All of them had multiple splenic abscesses without previous percutaneous drainage performed. These patients were younger and had less comorbidity compared with the other two groups of patients. The hospital course was also significantly shorter. Based on these findings, the optimal treatment for patients with splenic abscess should be splenectomy. This procedure not only removes the diseased organ, it also allows the surgeon to explore and manage the additional intra-abdominal infectious source(s). Among patients who are not surgical candidates, percutaneous drainage might be attempted first to allow the improvement of the patient's overall condition. Antibiotic treatment as a sole therapy should be quite selective. Surgeons should be involved early in the decision-making and management of these patients. We believe that a patient-centered multidisciplinary team is crucial in providing the best care to such patients.

Common to every retrospective study, a failure to account for various factors led to inherent problems with the data of our study. It is possible that three groups studied might not be comparable. Because surgeons were only involved in the care of patients undergoing splenectomy, whether a timely splenectomy could reverse the downhill course of patients treated with antibiotics alone or with percutaneous drainage remains unknown. It is possible that splenectomy group had a better survival rate because of a selection bias rather than lack of aggressive therapies for patients in the other treatment groups.

In conclusion, the early diagnosis of splenic abscess requires a high degree of suspicion and the liberal use of radiologic examinations. Hepatocellular carcinoma, especially those treated with TEA, is a significant risk factor of this disease entity. Splenectomy appears to be the most effective therapy. However, in critically ill patients, intravenous antibiotics with or without percutaneous drainage can be considered in selective patients.

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