

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Bakal CW, Sacks D, Burke DR, et al. Quality improvement guidelines for adult percutaneous abscess and fluid drainage. <i>J Vasc Interv Radiol.</i> 2003;14(9 Pt 2):S223-225.	Review/Other-Tx	N/A	Guidelines for adult percutaneous abscess and fluid drainage.	N/A	4
2. Arellano RS, Gervais DA, Mueller PR. CT-guided drainage of abdominal abscesses: hydrodissection to create access routes for percutaneous drainage. <i>AJR Am J Roentgenol.</i> 2011;196(1):189-191.	Observational-Tx	12 patients	To determine the clinical effectiveness of CT guided injection of 0.9% saline solution into the retroperitoneal space to create access routes for imaging-guided percutaneous abscess drainage.	Twelve patients (three men and nine women; mean age, 57 years; range, 26-84 years) with 12 abscesses underwent CT-guided percutaneous abscess drainage after injection of 0.9% saline solution into the retroperitoneum to displace structures and create an access route for drainage. The structures displaced using this technique included the ascending colon (n = 4), descending colon (n = 3), sigmoid colon (n = 2), duodenum (n = 2), and stomach (n = 1). The mean volume of 0.9% saline solution used to displace vital structures was 225 mL (range, 60-250 mL). Technical success was achieved in all 12 cases (100%). Procedural success was achieved in 11 (92%) of 12 cases.	3

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
<p>3. Ciftci TT, Akinci D, Akhan O. Percutaneous transhepatic drainage of inaccessible postoperative abdominal abscesses. <i>AJR Am J Roentgenol.</i> 2012;198(2):477-481.</p>	<p>Observational-Tx</p>	<p>30 patients</p>	<p>To evaluate the safety and efficacy of transhepatic drainage of inaccessible postoperative intra-abdominal abscesses under sonographic and fluoroscopic guidance.</p>	<p>The technical and clinical success rates were 100% and 97%. The procedures were performed with 8-, 10-, and 12-French locking pigtail catheters. The catheters were in place for a mean duration of 75 days if a fistula was present and 15 days in the absence of fistula. Major complications were not detected during treatment. The rate of minor complications (catheter dislodgement, obstruction, kinking) was 20%. Most of the complications were managed by exchange, revision, or increase in size of the catheter. When use of an 8-French catheter was compared separately with use of 10- and 12-French catheters, the rate of minor complications was found to be significantly higher for the 8-French group (P<0.05). 5 abscesses had fistulous communication with the pancreatic duct, jejunum, and biliary system. The mean duration of catheter use was increased by the presence of a fistula (P<0.05). When single-microbe, polymicrobial, and culture-negative abscesses were compared, the difference between groups with respect to mean duration of catheter use was not statistically significant (P>0.05). Mean duration also did not differ significantly between patients with an abscess volume greater than and those with an abscess volume <100 mL (P>0.05).</p>	<p>2</p>

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
4. Yamakado K, Takaki H, Nakatsuka A, et al. Percutaneous transhepatic drainage of inaccessible abdominal abscesses following abdominal surgery under real-time CT-fluoroscopic guidance. <i>Cardiovasc Intervent Radiol.</i> 2010;33(1):161-163.	Observational-Tx	12 consecutive patients	To evaluate the safety, feasibility, and clinical utility of transhepatic drainage of inaccessible abdominal abscesses retrospectively under real-time CT guidance.	For abdominal abscesses, 12 consecutive patients received percutaneous transhepatic drainage. Abscesses were considered inaccessible using the usual access route because they were surrounded by the liver and other organs. The maximum diameters of abscesses were 4.6–9.5 cm (mean, 6.7 ± 1.4 cm). An 8-French catheter was advanced into the abscess cavity through the liver parenchyma using real-time CT fluoroscopic guidance. Safety, feasibility, procedure time, and clinical utility were evaluated. Drainage catheters were placed with no complications in abscess cavities through the liver parenchyma in all patients. The mean procedure time was 18.8 ± 9.2 min (range, 12–41 min). All abscesses were drained. They shrank immediately after catheter placement.	3
5. vanSonnenberg E, Mueller PR, Ferrucci JT, Jr. Percutaneous drainage of 250 abdominal abscesses and fluid collections. Part I: Results, failures, and complications. <i>Radiology.</i> 1984;151(2):337-341.	Review/Other-Tx	212 patients underwent 250 percutaneous drainage procedures	To summarize the results, failures and complications of percutaneous abscess and fluid drainage procedures. Also, analysis and corrective measures of these problems are discussed.	In 209 cases, operation was avoided and the patients were cured (83.6%). Partial success was achieved in 18/41 recurrences and failures. Cures and partial successes totaled 227/250 (90.8%). Noninfected collections were successfully drained in 31/43 cases. There were 21 failures (8.4%) and 20 recurrences (8%). 26 patients experienced complications (10.4%), 7 of which were major (2.8%).	4
6. Laopaiboon V, Aphinives C, Prawiset P. Comparison of clinical success between CT-guided percutaneous drainage and open surgical drainage of intra-abdominal fluid collection in Srinagarind Hospital. <i>J Med Assoc Thai.</i> 2010;93 Suppl 3:S45-51.	Observational-Tx	43 patients	To compare clinical success of CT-guided percutaneous drainage with OSD of intra-abdominal fluid collections in Srinagarind hospital.	There was no statistically significant difference (P=0.520) in the clinical success between CT-PCD group (25/ 29 patients, 86.2%) and OSD group (11/14 patients, 78.5%). Complication in 4 patients (including 1 death) was found in the OSD group compared to zero patients in the CT-PCD group. The proportion of lesion subsided after CT-PCD (25/28 patients, 89.3%) was higher than OSD (10/14 patients, 71.4%). The mean times of hospital stay were 20.2 days in PCD and 24.5 days in OSD groups.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
7. Kumar RR, Kim JT, Haukoos JS, et al. Factors affecting the successful management of intra-abdominal abscesses with antibiotics and the need for percutaneous drainage. <i>Dis Colon Rectum</i> . 2006;49(2):183-189.	Observational-Tx	114 patients	Retrospective chart review. To evaluate the use of antibiotic therapy and percutaneous image-guided drainage in adult patients with intra-abdominal abscesses.	The majority of the patients with intra-abdominal abscesses improved with antibiotic therapy alone. Those patients with an abscess diameter >6.5 cm and temperature at admission >101.2 degrees F have higher likelihood of failing conservative therapy with antibiotics alone and requiring percutaneous drainage.	2
8. Siewert B, Tye G, Kruskal J, et al. Impact of CT-guided drainage in the treatment of diverticular abscesses: size matters. <i>AJR Am J Roentgenol</i> . 2006;186(3):680-686.	Observational-Dx	181 patients	To evaluate CT for the presence of an abscess, its location, maximum diameter, and feasibility of PAD and to determine whether abscess size can be used as a discriminating factor to guide management of patients with diverticular abscesses.	Patients with abscesses <3 cm in size can be treated with antibiotics alone and, in some cases, as outpatients, and may not uniformly require surgery. This is also likely true for patients with abscesses 3-4 cm in size. Patients with abscesses ≥4 cm can be managed with CT-guided abscess drainage followed by referral for surgical treatment.	3
9. Parc Y, Frileux P, Schmitt G, Dehni N, Ollivier JM, Parc R. Management of postoperative peritonitis after anterior resection: experience from a referral intensive care unit. <i>Dis Colon Rectum</i> . 2000;43(5):579-587; discussion 587-579.	Observational-Tx	32 patients	To evaluate management of postoperative peritonitis after anterior resection. All patients referred to a surgical intensive care unit during the past 10 years with generalized, multilocular, intra-abdominal sepsis after anterior resection was reviewed.	Extensive intra-abdominal infection after anterior resection may be efficiently controlled by a surgical approach combining peritoneal debridement, fecal diversion, and capillary drainage of the pelvis. Intestinal continuity may be restored after diversion stoma or Hartmann's procedure after high anterior resection. This is not the case after a Hartmann's operation after a low colorectal anastomosis, and this procedure should be avoided whenever possible.	2
10. Bouali K, Magotteaux P, Jadot A, et al. Percutaneous catheter drainage of abdominal abscess after abdominal surgery. Results in 121 cases. <i>J Belge Radiol</i> . 1993;76(1):11-14.	Observational-Tx	121 peritoneal, retroperitoneal and pelvic abscesses	To examine cases of PCD of abdominal abscess after abdominal surgery.	A definitive treatment was obtained in 74% of peritoneal abscesses, 67% of retroperitoneal abscesses and 82% of pelvic abscesses. Failure most commonly occurred with multiloculated lesions or lesions associated with fistulous communication. There was a low rate of complication (1%). Percutaneous drainage avoids the risks inherent in surgery and anesthesia, saves considerable time and meets greater patient acceptance.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
11. Cinat ME, Wilson SE, Din AM. Determinants for successful percutaneous image-guided drainage of intra-abdominal abscess. <i>Arch Surg.</i> 2002;137(7):845-849.	Observational-Tx	96 patients	Multicenter prospective study of patients who had intra-abdominal infections treated with PCD and IV antibiotics. Multivariate regression analysis determined predictors of successful outcome.	PCD of intra-abdominal infections was effective with a single treatment in 70% of patients and increased to 82% with a second attempt. A successful outcome is most likely with abscesses that are postoperative, not pancreatic, and not infected with yeast. PCD is now a commonly used staging method for the resolution of intra-abdominal sepsis prior to corrective operation.	1
12. Khurram Baig M, Hua Zhao R, Batista O, et al. Percutaneous postoperative intra-abdominal abscess drainage after elective colorectal surgery. <i>Tech Coloproctol.</i> 2002;6(3):159-164.	Observational-Tx	40 patients	To examine the clinical characteristics and outcomes of patients undergoing percutaneous drainage of intra-abdominal abscesses arising after elective colorectal procedures.	Percutaneous CT-guided abscess drainage is an effective method for treating intra-abdominal abscess following elective colorectal surgery. The primary success was 65% after the first and 85% after a second drainage. This technique should be considered as the treatment of choice in patients with localized intra-abdominal abscess without signs of generalized peritonitis.	3
13. Gaertner WB, Willis DJ, Madoff RD, et al. Percutaneous drainage of colonic diverticular abscess: is colon resection necessary? <i>Dis Colon Rectum.</i> 2013;56(5):622-626.	Observational-Tx	218 patients	To review the outcomes of patients who underwent percutaneous drainage of colonic diverticular abscess without subsequent operative intervention.	218 patients underwent percutaneous drainage of colonic diverticular abscesses. 32 patients (15%) did not undergo subsequent colonic resection. Abscess location was pelvic (n = 9) and paracolic (n = 23), the mean abscess size was 4.2 cm, and the median duration of percutaneous drainage was 20 days. The comorbidities of this group of patients included severe cardiac disease (n = 16), immunodeficiency (n = 7), and severe pulmonary disease (n = 6). Freedom from recurrence at 7.4 years was 0.58 (95% CI 0.42-0.73). All recurrences were managed nonoperatively. Recurrence was significantly associated with an abscess size >5 cm. Colectomy-free survival at 7.4 years was 0.17 (95% CI, 0.13–0.21).	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
14. Poritz LS, Koltun WA. Percutaneous drainage and ileocelectomy for spontaneous intraabdominal abscess in Crohn's disease. <i>J Gastrointest Surg.</i> 2007;11(2):204-208.	Review/Other-Tx	19 patients	Retrospective chart review. To evaluate the success of a protocol (initial percutaneous drainage of the abscess, 5–7 days of broad spectrum IV antibiotics with simultaneous high-dose steroids and hyperalimentation, followed by planned 1 stage resection with primary anastomosis) with regard to length of stay, complications associated with the protocol, and its ability to avoid stoma creation.	Crohn's disease patients with intra-abdominal abscess can safely undergo planned resection with primary anastomosis if initially treated with successful percutaneous drainage and aggressive antibiotic and steroid management. Such a protocol provides a standard of care against which nonsurgical management can be compared and judged.	4
15. Xie Y, Zhu W, Li N, Li J. The outcome of initial percutaneous drainage versus surgical drainage for intra-abdominal abscesses in Crohn's disease. <i>Int J Colorectal Dis.</i> 2012;27(2):199-206.	Observational-Tx	23 patients	To retrospectively analyze the outcome of initial percutaneous drainage vs initial surgical drainage for intra-abdominal abscesses in Crohn's disease.	Patients were divided into initial percutaneous drainage group (n = 10) and initial surgery group (n = 13): post-drainage complications were more common in initial surgery group (2/10 vs 9/13, P=0.036), abscess recurred in 3 patients (2/10 vs 1/13, NS), and subsequent surgery was needed in 10 patients (6/10 vs 4/13, NS). Ultimate stoma creation were significantly more in initial surgery group (1/10 vs 9/13, P=0.01).	2
16. Gervais DA, Hahn PF, O'Neill MJ, Mueller PR. Percutaneous abscess drainage in Crohn disease: technical success and short- and long-term outcomes during 14 years. <i>Radiology.</i> 2002;222(3):645-651.	Observational-Tx	32 patients	Review medical records of patients to determine technical success with PAD in patients with Crohn's disease during 14 years.	PAD has a high technical success rate of 96%. Half of patients may avoid surgery in the short term.	2
17. Gutierrez A, Lee H, Sands BE. Outcome of surgical versus percutaneous drainage of abdominal and pelvic abscesses in Crohn's disease. <i>Am J Gastroenterol.</i> 2006;101(10):2283-2289.	Observational-Tx	66 patients	To examine the effect of either surgical or percutaneous drainage therapy on time to resolution of abdominal and pelvic abscesses in Crohn's disease.	Time to resolution of abdominal or pelvic abscesses in Crohn's disease is similar with percutaneous drainage and surgery. One-third of patients treated with percutaneous drainage required surgery within 1 year. Earlier intervention for abdominal and pelvic abscesses is associated with shorter time to resolution.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
18. Muller-Wille R, Iesalnieks I, Dornia C, et al. Influence of percutaneous abscess drainage on severe postoperative septic complications in patients with Crohn's disease. <i>Int J Colorectal Dis.</i> 2011;26(6):769-774.	Review/Other-Tx	25 patients with spontaneous intra-abdominal abscesses	To compare the incidence of severe postoperative intra-abdominal septic complications in patients undergoing intestinal resections with and without preoperative PAD before definitive surgery. The incidence of postoperative intra-abdominal septic complications in patients with (group I) and without (group II) preoperative PAD (Fisher's exact test) were compared.	PAD was performed in 12/25 patients (48%), with an average of 37 days before surgery (range, 6-83 days). The overall rate of postoperative intra-abdominal septic complications was 48% (12/25 patients). In group I, postoperative intra-abdominal septic complications occurred in 3/12 patients (25%). In group II, postoperative intra-abdominal septic complications were assessed in 9/13 patients (69%). The differences between these 2 groups were considered to be statistically significant (P=0.04). PAD of intra-abdominal abscesses before surgery could significantly reduce the occurrence of severe postoperative intra-abdominal septic complications in patients with Crohn's disease.	4
19. Bafford AC, Coakley B, Powers S, et al. The clinical impact of preoperative percutaneous drainage of abdominopelvic abscesses in patients with Crohn's disease. <i>Int J Colorectal Dis.</i> 2012;27(7):953-958.	Observational-Tx	70 patients	To compare outcomes following the treatment of intra-abdominal Crohn's abscesses with percutaneous drainage followed by surgery to those after surgery alone.	70 patients with Crohn's disease-related abdominopelvic abscesses were identified, 38 (54%) of whom underwent drainage before surgery. Percutaneous drainage was technically successful in 92% of patients and clinically successful in 74% of patients. No differences in rate of septic complications (P=0.14) or need for stoma creation (P=0.78) were found. Patients who underwent percutaneous drainage had greater overall hospital lengths of stay (mean 15.8 vs 12.2 days, P=0.007); 8.6% of patients had long-term postponement of surgery after percutaneous drainage.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
20. Hussain MI, Al-Akeely MH, Alam MK, Al-Qahatani HH, Al-Salamah SM, Al-Ghamdi OA. Management of appendiceal abscess. A 10-year experience in Central Saudi Arabia. <i>Saudi Med J</i> . 2012;33(7):745-749.	Observational-Tx	80 patients	To study the outcome of patients with appendiceal abscess following immediate operative and nonoperative management in terms of complications and hospital stay.	80 appendiceal abscess patients were managed during the study period. 42 patients (52.5%) received nonoperative management, while 38 patients (47.5%) underwent immediate operative management. The complication rate was significantly higher in the operative management group compared with the nonoperative management group (44.7% vs 11.9%; P=0.0012). Successful nonoperative management was achieved in 92.8% of patients. The overall mean hospital stay of the nonoperative management group was 8.54+/- 2.25, and the operative management group was 10.86+/-4.32 days (P=0.003).	2
21. Kaminski A, Liu IL, Applebaum H, Lee SL, Haigh PI. Routine interval appendectomy is not justified after initial nonoperative treatment of acute appendicitis. <i>Arch Surg</i> . 2005;140(9):897-901.	Observational-Tx	32,938 patients hospitalized with acute appendicitis	Retrospective study to evaluate outcomes for children treated without interval appendectomy after successful nonoperative management of perforated appendicitis.	Recurrent appendicitis is rare in pediatric patients after successful nonoperative management of perforated appendicitis. Routine interval appendectomy is not necessarily indicated for these children.	2
22. Simillis C, Symeonides P, Shorthouse AJ, Tekkis PP. A meta-analysis comparing conservative treatment versus acute appendectomy for complicated appendicitis (abscess or phlegmon). <i>Surgery</i> . 2010;147(6):818-829.	Review/Other-Tx	17 studies and 1,572 patients: 847 received conservative treatment and 725 had acute appendectomy	Meta-analysis comparing conservative treatment vs acute appendectomy for complicated appendicitis (abscess or phlegmon). Studies included 16 nonrandomized retrospective and 1 nonrandomized prospective.	Conservative treatment was associated with significantly less overall complications, wound infections, abdominal/pelvic abscesses, ileus/bowel obstructions, and reoperations. No significant difference was found in the duration of first hospitalization, the overall duration of hospital stay, and the duration of IV antibiotics. Overall complications remained significantly less in the conservative treatment group during sensitivity analysis of studies including only pediatric patients, high-quality studies, more recent studies, and studies with a larger group of patients. The conservative management of complicated appendicitis is associated with a decrease in complication and reoperation rate compared with acute appendectomy and it has a similar duration of hospital stay. Because of significant heterogeneity between studies, additional studies should be undertaken to confirm these findings.	4

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
23. Gee MS, Kim JY, Gervais DA, Hahn PF, Mueller PR. Management of abdominal and pelvic abscesses that persist despite satisfactory percutaneous drainage catheter placement. <i>AJR Am J Roentgenol.</i> 2010;194(3):815-820.	Observational-Tx	3,027 PAD catheters in 2,224 patients	To determine the frequency with which percutaneous abdominopelvic abscess drainage catheters must be replaced because of inadequate drainage, to assess the effect of percutaneous catheter exchange on clinical outcome, and to determine the predictors of clinical success after catheter exchange.	Among the 3,027 PAD catheters placed, 82 were exchanged because of lack of improvement (imaging evidence of undrained fluid and persistent fever and leukocytosis), for an overall frequency of catheter exchange of 2.7% of abscesses in 3.7% of patients. The success rate of catheter replacement, defined as resolution of the fluid collection without OSD, was 76.8% (63/82). Prognostic factors favorably influencing the clinical success of catheter exchange included a larger number of drainage catheter sideholes, absence of a fistula, low residual abscess volume after initial catheter drainage, and low CT attenuation of abscess fluid.	2
24. Bae JH, Kim GC, Ryeom HK, Jang YJ. Percutaneous embolization of persistent biliary and enteric fistulas with Histoacryl. <i>J Vasc Interv Radiol.</i> 2011;22(6):879-883.	Observational-Tx	11 days	To describe our experience with transcatheter n-butyl-2-cyanoacrylate embolization of refractory enteric or biliary fistulas.	In all patients, enteric or biliary fistula output ceased after 1 or 2 procedures without any complications. No recurrence was noted during follow-up of 9–17 months.	2
25. Beland MD, Gervais DA, Levis DA, Hahn PF, Arellano RS, Mueller PR. Complex abdominal and pelvic abscesses: efficacy of adjunctive tissue-type plasminogen activator for drainage. <i>Radiology.</i> 2008;247(2):567-573.	Observational-Tx	43 patients; 46 abscesses	To retrospectively evaluate the effectiveness and safety of tPA for drainage of abdominal and pelvic abscesses refractory to simple catheter drainage.	Intracavitary tPA is safe and effective for draining complex fluid collections, with most patients avoiding surgery.	2
26. Gervais DA, Levis DA, Hahn PF, Uppot RN, Arellano RS, Mueller PR. Adjunctive intrapleural tissue plasminogen activator administered via chest tubes placed with imaging guidance: effectiveness and risk for hemorrhage. <i>Radiology.</i> 2008;246(3):956-963.	Observational-Tx	66 patients	To retrospectively determine the effectiveness of and risk for hemorrhage with intrapleural adjunctive tPA administered via chest tubes placed with imaging guidance.	57 (86%) of 66 patients underwent complete drainage with tPA without further surgical procedures. Primary effectiveness was seen in 52 (87%) of 60 patients and secondary effectiveness was seen in 5 (83%) of 6. Intrapleural tPA is effective in improving drainage of loculated effusions not drained with catheters alone; prophylactic systemic anticoagulation does not increase bleeding risk with intrapleural tPA, but therapeutic anticoagulation is associated with a significantly increased risk of pleural hemorrhage.	3

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
27. Statler JD, Doherty RD, McLaughlin JJ, Gleason JD, McDermott MP. Tissue plasminogen activator in the percutaneous drainage of splenic abscess. <i>J Vasc Interv Radiol.</i> 2010;21(2):307-309.	Review/Other-Tx	2 patients	To describe the safe application of fibrinolysis in 2 cases of splenic abscess. 2 cases in which tPA was used as an adjuvant treatment in the drainage of complex splenic abscesses are presented.	The authors believe that fibrinolytic therapy in the treatment of complex splenic abscesses results in more rapid and more successful resolution of these collections. According to the authors, their experiences indicate that the use of tPA to assist in the drainage of splenic abscess is safe, and further investigation of this practice is warranted.	4
28. Laborda A, De Gregorio MA, Miguélena JM, et al. Percutaneous treatment of intrabdominal abscess: urokinase versus saline serum in 100 cases using two surgical scoring systems in a randomized trial. <i>Eur Radiol.</i> 2009;19(7):1772-1779.	Experimental-Tx	100 patients	Randomized trial to assess whether regular instillation of urokinase during abscess drainage leads to an improved outcome compared to saline irrigation alone. Patients were randomized between thrice daily urokinase instillation or saline irrigation alone. Patient medical records were reviewed to determine drainage, study group, Altona and Mannheim scoring, duration of drainage, procedure-related complications, and hospital stay duration, and clinical outcome at the end of study.	Technical success rate of the PAD was 100%. The success or failure of abscess remission did not differ significantly between groups (success rate of 91.5% in the urokinase group vs 88.8% in the saline group; failure rate was of 8.5% vs 21.2%, respectively); however, days of drainage, main hospital stay, and overall costs were significantly reduced in patients treated with urokinase compared to the control group (P<0.05). Surgical scores were a useful homogeneity factor, and Mannheim scoring showed a good correlation with prognosis, while Altona scoring results did not have a significant correlation. For drainage of complex abscesses (loculations, hemorrhage, viscous material), fibrinolytics safely accelerate drainage and recovery, reducing the length of the hospital stay and, therefore, the total cost.	1
29. Cheng D, Nagata KT, Yoon HC. Randomized prospective comparison of alteplase versus saline solution for the percutaneous treatment of loculated abdominopelvic abscesses. <i>J Vasc Interv Radiol.</i> 2008;19(6):906-911.	Experimental-Tx	20 patients: 11 received alteplase and 9 received normal saline solution	Randomized trial to determine if alteplase infusion for the treatment of loculated abdominopelvic abscesses requiring PCD was superior to saline solution infusion.	There was no significant difference in the distribution of sex (P=.08) or age (P=.29). Abscess resolution was achieved in 9/11 alteplase-treated patients (80%) vs 3/9 saline solution-treated patients (33%). However, 1 patient in each group required repeat intervention within 30 days, for overall success rates of 73% vs 22%, respectively (P=.02). Having observed a significant difference in the primary outcome variable, the study was terminated early. A 3-day course of twice-daily alteplase infusion therapy is superior to normal saline solution for the treatment of loculated abdominopelvic abscesses.	1

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
30. Demir E, Alan C, Kilciler M, Bedir S. Comparison of ethanol and sodium tetradecyl sulfate in the sclerotherapy of renal cyst. <i>J Endourol.</i> 2007;21(8):903-905.	Observational-Tx	65 patients; 68 cysts	To compare the efficacy and side effects of ethanol and sodium tetradecyl sulfate as sclerosants for symptomatic simple renal cyst.	Ethanol and sodium tetradecyl sulfate are simple, noninvasive, cost-effective, and well-tolerated sclerosants for the treatment of simple renal cysts. Prefer sodium tetradecyl sulfate as a first choice because it causes less pain (pain score 2.1 ± 1.1 vs 3.8 ± 1.2 for ethanol; $P=0.019$).	1
31. Do H, Lambiase RE, Deyoe L, Cronan JJ, Dorfman GS. Percutaneous drainage of hepatic abscesses: comparison of results in abscesses with and without intrahepatic biliary communication. <i>AJR Am J Roentgenol.</i> 1991;157(6):1209-1212.	Observational-Tx	8 patients with 8 abscesses; 22 patients with 26 abscesses	To analyze 2 groups (patients with intrahepatic biliary communication vs patients without biliary communication) to determine whether the presence of an intrahepatic biliary communication affected the outcome of treatment.	Duration of drainage was longer ($P<.05$) in patients with communication (range, 7-44 days; mean, 22 days) than in patients without communication (range, 1-33 days; mean, 13 days). Percutaneous drainage was curative in 5 (63%) and palliative or temporizing in 1 (13%) of 8 patients with communication. It was curative in 15 (68%) and palliative or temporizing in 5 (23%) of 22 patients without communication ($P=.317$).	2
32. Schuster MR, Crummy AB, Wojtowycz MM, McDermott JC. Abdominal abscesses associated with enteric fistulas: percutaneous management. <i>J Vasc Interv Radiol.</i> 1992;3(2):359-363.	Review/Other-Tx	150 abscesses	To analyze percutaneous methods used in the management of abdominal abscesses with fistulas.	Treatment of abdominal abscesses with fistulas by means of percutaneous methods is reliable and safe.	4
33. Mueller PR, White EM, Glass-Royal M, et al. Infected abdominal tumors: percutaneous catheter drainage. <i>Radiology.</i> 1989;173(3):627-629.	Review/Other-Tx	16 patients	To analyze use of PCD in infected primary (n=9) or metastatic abdominal tumors (n=7).	The major differences between drainage of necrotic tumors and drainage of standard abscesses were the need for surgery in the majority of the cases and the fact that patients needed the catheters for continued palliation until their death.	4
34. Chang KC, Chuah SK, Changchien CS, et al. Clinical characteristics and prognostic factors of splenic abscess: a review of 67 cases in a single medical center of Taiwan. <i>World J Gastroenterol.</i> 2006;12(3):460-464.	Observational-Tx	67 patients	Retrospective study to analyze cases of splenic abscess in a medical center of Taiwan during a period of 19 years. Clinical characteristics, underlying diseases, organism spectra, therapeutic methods, APACHE II scores, and mortality rates were analyzed.	Patients with gram negative bacillus infection ($P=0.009$) and multiple abscesses ($P=0.011$) experienced a higher mortality rate than patients with gram positive coccus infection and solitary abscess. The mean APACHE II score of 12 expired patients (16.3 ± 3.2) was significantly higher than that of the 55 survivals (7.2 ± 3.8) ($P<0.001$). Multiple splenic abscesses, gram negative bacillus infection, and high APACHE II scores are poor prognostic factors. Early surgical intervention should be encouraged when these risk factors are present.	3

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
35. Tung CC, Chen FC, Lo CJ. Splenic abscess: an easily overlooked disease? <i>Am Surg.</i> 2006;72(4):322-325.	Observational-Tx	51 patients	Retrospective review of medical records to analyze the demographics, clinical manifestations, etiology, predisposing factors, diagnostic modalities, bacteriologic profile, treatment, and outcome of patients with splenic abscess.	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 IV antibiotics alone.	2
36. Choudhury SR, Debnath PR, Jain P, et al. Conservative management of isolated splenic abscess in children. <i>J Pediatr Surg.</i> 2010;45(2):372-375.	Review/Other-Tx	18 children	Retrospective study to examine the diagnosis, etiology, treatment, and outcome of isolated splenic abscess in children.	Isolated splenic abscess in children responds favorably to conservative treatment with IV broad-spectrum antibiotics and percutaneous drainage without the need for splenectomy.	4
37. Lee WS, Choi ST, Kim KK. Splenic abscess: a single institution study and review of the literature. <i>Yonsei Med J.</i> 2011;52(2):288-292.	Observational-Tx	18 patients	To review our experience with splenic abscesses, with respect to the relevant aspects of splenic abscesses and treatment outcomes.	The most common symptom at presentation was abdominal pain in 12 patients (66.7%). The median duration from symptom onset until establishment of a diagnosis was 22 days. <i>Streptococcus viridans</i> was the most common pathogen (27.8%), follow by <i>Klebsiella pneumoniae</i> (22.2%). The mortality rate during the inpatient period and the previous 90 days was 16.6%. 3/4 patients with <i>Klebsiella pneumoniae</i> showed a single abscess pocket. 4 patients (22.2%) underwent percutaneous drainage, 8 (44.5%) received antibiotic treatment only and 6 (33.3%) underwent splenectomy.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
38. Mezhir JJ, Fong Y, Fleischer D, et al. Pyogenic abscess after hepatic artery embolization: a rare but potentially lethal complication. <i>J Vasc Interv Radiol.</i> 2011;22(2):177-182.	Review/other-Tx	971 patients underwent 2,045 HAE procedures	Clinical and pathologic variables of patients treated with HAE were collected and analyzed to determine the etiology, incidence, and outcome of pyogenic hepatic abscess.	From January 1998 to January 2010, 971 patients underwent 2,045 HAE procedures. 14 patients developed a pyogenic hepatic abscess after embolization, for an overall rate of 1.4%. 34 patients (4%) had a history of bilioenteric anastomosis and 21 patients (2%) lacked a competent sphincter of Oddi because of the presence of a biliary stent (n = 19) or a previous sphincterotomy (n = 2). 11/34 patients with a bilioenteric anastomosis (33%) and 2/21 patients with an incompetent sphincter (10%) developed abscesses, in contrast to only 1 abscess (0.05%) among the 916 patients with apparently normal sphincters (0.1%; odds ratio, 437.6; 95% CI, 54.2–3,533; P<.0001). Gram-negative and Gram-positive aerobes were the most common bacteria isolated after drainage. Percutaneous drainage was the initial management strategy in all patients; 2 patients (14%) required subsequent surgical drainage and hepatectomy, and 3 (21%) died.	4

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
39. Law ST, Kong Li MK. Is there any difference in pyogenic liver abscess caused by <i>Streptococcus milleri</i> and <i>Klebsiella</i> spp?: retrospective analysis over a 10-year period in a regional hospital. <i>J Microbiol Immunol Infect.</i> 2013;46(1):11-18.	Observational-Dx	161 patients	To compare the clinical characteristics of patients with <i>Streptococcus milleri</i> and <i>Klebsiella</i> spp. associated pyogenic liver abscess.	From 2000 to 2009 inclusive, 21 and 140 patients had <i>Streptococcus milleri</i> and <i>Klebsiella</i> spp. associated monomicrobial infected pyogenic liver abscess, respectively. A higher incidence of active malignancy occurred in the <i>Streptococcus milleri</i> group (14.3% vs 3.6%, P<0.03). The common clinical features of the patients were fever, chill and right upper quadrant pain. A longer duration (6.3 vs 4.4 day, P=0.04) of symptoms and a higher incidence of hepatomegaly (14.3% vs 2.9%, P<0.01) occurred in the <i>Streptococcus milleri</i> group. Common laboratory and imaging abnormalities included: anemia, leukocytosis, high erythrocyte sedimentation rate and C-reactive protein, hypoalbuminemia, elevated total bilirubin and alanine aminotransferase, right hepatic lobe involvement, hypoechoic in US, rim enhancement and septal lobulation in CT. The biliary tract disorder was the most common cause of the disease in the 2 groups. Patients with <i>Klebsiella</i> spp. associated pyogenic liver abscess tended to have more complications: bacteremia (61.6% vs 31.6%, P<0.01) septic shock (33.6% vs 19%, P=0.11), disseminated intravascular coagulation (20.7% vs 4.8%, P=0.04), metastatic infections (10.7% vs 0%, P=0.06), acute renal and respiratory failure (5% vs 0%, P=0.14). However, both were effectively managed by the combination of antibiotics and image-guided aspiration with/without drainage, and their mortality rates were comparable to each other. Those patients with metastatic infection might need a longer duration (6.07 vs 5.32 week, P=0.144) of antibiotic therapy, which was due to the longer mean duration (3.85 vs 2.86, P<0.04) of an IV counterpart.	4

Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
40. Qin SL, Wang AX, Sheng RY, Liu ZY. [Clinical analysis of 36 cases with amebic liver abscess]. <i>Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi</i> . 2000;18(6):356-358.	Review/Other-Tx	36 patients	Retrospective review to investigate the clinical features of amebic liver abscess, the causes of misdiagnosis and the effect of medical and surgical therapy on patient's prognosis.	Medical therapy alone was excellent for small abscesses, while percutaneous needle aspiration or draining was a successful approach in patients with large abscesses.	4
41. Stain SC, Yellin AE, Donovan AJ, Brien HW. Pyogenic liver abscess. Modern treatment. <i>Arch Surg</i> . 1991;126(8):991-996.	Review/Other-Tx	54 patients	To review records of patients with pyogenic liver abscess to determine whether earlier diagnosis with current imaging tests and definitive treatment with antibiotics, aspiration, or catheter drainage was an effective alternative to open drainage.	Pyogenic liver abscess can be successfully treated with broad-spectrum antibiotics and aspiration or PCD. OSD is reserved for patients in whom treatment fails or who require celiotomy for concurrent disease.	4
42. Bradley EL, 3rd. A clinically based classification system for acute pancreatitis. Summary of the International Symposium on Acute Pancreatitis, Atlanta, Ga, September 11 through 13, 1992. <i>Arch Surg</i> . 1993;128(5):586-590.	Review/Other-Dx	40 experts	A summary of the clinically based classification system for acute pancreatitis.	Classification system will be valuable to practicing clinicians and academicians seeking to compare inter institutional data.	4
43. Giovannini M, Pesenti C, Rolland AL, Moutardier V, Delpero JR. Endoscopic ultrasound-guided drainage of pancreatic pseudocysts or pancreatic abscesses using a therapeutic echo endoscope. <i>Endoscopy</i> . 2001;33(6):473-477.	Observational-Tx	35 patients	To evaluate a new drainage technique for pancreatic pseudocysts or pancreatic abscesses entirely guided by EUS and using an interventional echo endoscope with a linear curved array transducer.	Internal drainage of pancreatic pseudocysts and abscesses exclusively performed with an echo endoscope is a safe and efficient method which should be evaluated further in larger studies.	3
44. Lang EK, Paolini RM, Pottmeyer A. The efficacy of palliative and definitive percutaneous versus surgical drainage of pancreatic abscesses and pseudocysts: a prospective study of 85 patients. <i>South Med J</i> . 1991;84(1):55-64.	Review/Other-Tx	85 patients	Prospective study to compare the efficacy of percutaneous to surgical drainage in patients with pancreatic abscesses and pseudocysts.	Study established distinct advantages of percutaneous drainage under CT and US guidance: The procedures can be carried out under US guidance in an intensive care unit on critically ill patients. The technique proved highly effective for initial palliation, with defervescence and stabilization occurring in most critically ill patients within 48 hours. Findings from fine needle aspiration provided valuable information as to microorganisms and antibiotic sensitivities and differed in 29/85 patients from those of concomitant blood cultures. Definitive eradication of the process (surgical ablation of residual necrotic material) can be elected after the patient's clinical condition stabilizes.	4
45. Mithofer K, Mueller PR, Warshaw AL. Interventional and surgical treatment of pancreatic abscess. <i>World J Surg</i> . 1997;21(2):162-168.	Review/Other-Tx	39 patients	To determine value of PCD in treating patients with pancreatic abscess.	PCD was used in patients during 1987-1995. Only 9/29 (31%) attempts at primary therapy were successful; 2 patients died, and 18 required subsequent surgical drainage.	4

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
46. Park JJ, Kim SS, Koo YS, et al. Definitive treatment of pancreatic abscess by endoscopic transmural drainage. <i>Gastrointest Endosc.</i> 2002;55(2):256-262.	Observational-Tx	9 patients; 11 pancreatic abscesses	To assess the feasibility, safety, and effectiveness of endoscopic transmural drainage for the treatment of pancreatic abscesses compressing the gut lumen.	Endoscopic transmural drainage is an effective therapy with minimal morbidity for pancreatic abscess compressing the gut lumen and is a valuable alternative to surgical drainage.	2
47. Rotman N, Mathieu D, Anglade MC, Fagniez PL. Failure of percutaneous drainage of pancreatic abscesses complicating severe acute pancreatitis. <i>Surg Gynecol Obstet.</i> 1992;174(2):141-144.	Review/Other-Tx	14 patients	To report outcomes of patients with severe acute pancreatitis selected to undergo percutaneous drainage of pancreatic abscess, under CT scan guidance.	Percutaneous drainage has a better efficiency in the treatment of residual collections postoperatively than as a primary treatment of infected fluid collections.	4
48. Steiner E, Mueller PR, Hahn PF, et al. Complicated pancreatic abscesses: problems in interventional management. <i>Radiology.</i> 1988;167(2):443-446.	Review/Other-Tx	25 patients	To report cases of patients treated with percutaneous drainage. The patients required multiple CT examinations, multiple catheter insertions, multiple catheter manipulations, and long-term catheter drainage.	8/25 patients were successfully treated with catheter drainage alone. 16 underwent surgical drainage, 10 after attempts at percutaneous drainage and 6 prior to radiologic drainage. Of the 10 patients who had initial percutaneous drainage, only 4 were clinically improved from the drainage procedure alone.	4
49. Venu RP, Brown RD, Marrero JA, Pastika BJ, Frakes JT. Endoscopic transpapillary drainage of pancreatic abscess: technique and results. <i>Gastrointest Endosc.</i> 2000;51(4 Pt 1):391-395.	Observational-Tx	22 patients	To determine the effectiveness of endoscopic transpapillary drainage in patients with pancreatic abscess.	Endoscopic transpapillary drainage is an effective nonoperative therapy for selected cases of pancreatic abscess and is associated with minimal morbidity and no mortality.	3
50. Coelho RF, Schneider-Monteiro ED, Mesquita JL, Mazzucchi E, Marmo Lucon A, Srougi M. Renal and perinephric abscesses: analysis of 65 consecutive cases. <i>World J Surg.</i> 2007;31(2):431-436.	Review/Other-Tx	65 consecutive patients	Review medical records to describe the diagnosis and treatment of renal, perinephric, and mixed abscesses in an academic reference center.	Perinephric and mixed abscesses are successfully managed by interventional treatment. Renal abscesses can be managed by medical treatment only, reserving interventional treatment for large collections or patients with clinical impairment. Early diagnosis is an important factor in the outcome of renal and perinephric abscesses.	4
51. Yen DH, Hu SC, Tsai J, et al. Renal abscess: early diagnosis and treatment. <i>Am J Emerg Med.</i> 1999;17(2):192-197.	Observational-Dx	88 patients	Retrospective review to identify initial clinical characteristics that can lead to early diagnosis of renal abscess in the emergency department and predict poor prognosis. Patients were categorized into 2 groups. In group 1, renal abscess was diagnosed by an emergency physician, whereas in group 2 renal abscesses were not diagnosed by an emergency physician.	The duration of diagnosis by emergency physicians was shorter for group 1 patients ($1.2 \pm .4$ vs group 2, 2.8 ± 2.9 days; $P < .01$) and the blood urea nitrogen level was higher in group 1 (55.7 ± 42.2 mg/dL, vs group 2, 33.5 ± 33.5 mg/dL; $P = .02$).	3

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
52. Moreira Jda S, Camargo Jde J, Felicetti JC, Goldenfun PR, Moreira AL, Porto Nda S. Lung abscess: analysis of 252 consecutive cases diagnosed between 1968 and 2004. <i>J Bras Pneumol</i> . 2006;32(2):136-143.	Review/Other-Tx	252 consecutive patients	To analyze the management of patients with aspiration lung abscess.	Lung abscess occurred predominantly in male adults presenting dental disease and having a history of loss of consciousness. Aspiration lung abscess is typically accompanied by unilateral cavitation, is found in zones of the lung that are preferential for aspiration and contains mixed flora. Most of the patients were treated clinically with antibiotics and postural drainage, although some surgical procedure was required in one-fifth of the study sample.	4
53. vanSonnenberg E, D'Agostino HB, Casola G, Wittich GR, Varney RR, Harker C. Lung abscess: CT-guided drainage. <i>Radiology</i> . 1991;178(2):347-351.	Review/Other-Tx	19 patients	To evaluate CT-guided drainage in the treatment of lung abscesses.	The abscess was cured (by clinical and radiographic criteria) in all 19 patients (100%), and surgery was avoided in 16 of the 19 patients (84%). 3 patients underwent surgery for removal of organized tissue or decortication after the lung abscess was evacuated. Complications included a hemothorax that required a chest tube in 1 patient and 3 minor complications (a clogged catheter in 2 patients and transient elevation of intracerebral pressure in 1 patient). The hemothorax occurred in 1 of 2 patients in whom the catheter traversed normal lung. The percutaneous drainage catheters traversed juxtaposed abnormal pleura on route to the abscess in 17 of the patients. CT-guided drainage of lung abscess is an effective method to treat lung abscesses that are refractory to conventional therapy; the procedure should obviate major operation in most patients. A catheter route through abscess-pleural syndesis is preferable, and CT is useful for planning this route.	4

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
54. Yellin A, Yellin EO, Lieberman Y. Percutaneous tube drainage: the treatment of choice for refractory lung abscess. <i>Ann Thorac Surg.</i> 1985;39(3):266-270.	Review/Other-Tx	48 patients	To assess percutaneous tube drainage in the treatment of lung abscess.	All were successfully treated by percutaneous tube drainage initiated under local anesthesia, and all recovered completely. There were no relapses after a follow-up period of 2 to 5 years. During this period, we did not perform pulmonary resection for primary lung abscess. 3 patients with malignant abscesses were also treated initially by transthoracic drainage but eventually required surgical intervention. It is concluded that percutaneous transthoracic drainage is an efficient and safe mode of treatment, and recommend transthoracic drainage as the treatment of choice for long-standing, refractory primary lung abscesses.	4
55. Kelogrigoris M, Tsagouli P, Stathopoulos K, Tsagaridou I, Thanos L. CT-guided percutaneous drainage of lung abscesses: review of 40 cases. <i>JBR-BTR.</i> 2011;94(4):191-195.	Observational-Tx	40 patients	To evaluate the safety and effectiveness of CT-guided percutaneous drainage of lung abscesses considering success rate vs complications.	Lung abscess completely resolved with no residual cavity in 33 patients. 7 patients had residual cavity and surgery was performed. Thus, the success rate of radiological drainage of the lung abscesses (33/40) was 83%. 5 (13%) patients developed pneumothorax. 3 developed moderate pneumothorax and chest-tube needed to be inserted and 2 patients developed mild pneumothorax which was managed with aspiration. These patients were kept under observation and followed-up by chest X-rays. No other complications and no mortality occurred during the procedure for all the 40 patients.	3
56. Marom EM, Patz EF, Jr., Erasmus JJ, McAdams HP, Goodman PC, Herndon JE. Malignant pleural effusions: treatment with small-bore-catheter thoracostomy and talc pleurodesis. <i>Radiology.</i> 1999;210(1):277-281.	Observational-Tx	32 patients	To determine the value of small-bore-catheter thoracostomy and talc pleurodesis in the treatment of malignant pleural effusions.	23 patients (72%) had a complete response; 4 (12%), a partial response; and 5 (16%), no response. Symptoms in all those who responded were clinically improved. Complications included fever in 13 patients (41%) and moderate shortness of breath, chest pain, or both in 6 (19%). Small-bore-catheter thoracostomy and talc pleurodesis was successful in treating malignant pleural effusions.	1

Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
57. Warren WH, Kalimi R, Khodadadian LM, Kim AW. Management of malignant pleural effusions using the Pleur(x) catheter. <i>Ann Thorac Surg.</i> 2008;85(3):1049-1055.	Review/Other-Tx	202 patients	To determine the value of the Pleur(x) catheter in treating patients with malignant pleural effusions. 231 Pleur(x) catheters were inserted into patients.	Insertion of Pleur(x) catheters is an effective way to treat patients with a malignant pleural effusion on an outpatient basis with a high degree of patient compliance and few complications. Overall, almost 60% of the catheters can be removed with a very low chance of reaccumulation, and without the need to instill a sclerosing agent.	4
58. Arellano RS, Gervais DA, Mueller PR. Computed tomography-guided drainage of mediastinal abscesses: clinical experience with 23 patients. <i>J Vasc Interv Radiol.</i> 2011;22(5):673-677.	Observational-Tx	23 patients with 24 mediastinal abscesses underwent 25 CT-guided drainage procedures	To evaluate the technical and clinical success rates of CT-guided percutaneous drainage of mediastinal abscesses.	Technical success was achieved in all 25 attempts (100%). 22/23 patients had complete resolution of the abscess without the need for surgical debridement, for a clinical success rate of 95.6%. One patient underwent technically and clinically successful abscess drainage but required surgical exploration for repair of an anastomotic leak after esophagogastrectomy. There was 1 complication. One patient had inadvertent placement of a catheter within a pulmonary vein. The catheter was removed after 24 hours without hemodynamic consequences. Percutaneous CT-guided drainage of mediastinal abscesses is an uncommon procedure, but the results of this study suggest that it is associated with high technical and clinical success rates.	3
59. Cahill AM, Baskin KM, Kaye RD, Fitz CR, Towbin RB. Transgluteal approach for draining pelvic fluid collections in pediatric patients. <i>Radiology.</i> 2005;234(3):893-898.	Observational-Tx	51 patients; 140 abscesses	Retrospective analysis of a database to evaluate a transgluteal approach for draining pelvic fluid collections in pediatric patients.	The transgluteal approach to the drainage of abdominopelvic fluid collections with imaging guidance is safe and effective.	3
60. Harisinghani MG, Gervais DA, Maher MM, et al. Transgluteal approach for percutaneous drainage of deep pelvic abscesses: 154 cases. <i>Radiology.</i> 2003;228(3):701-705.	Observational-Tx	140 patients; 154 deep pelvic abscesses	Review medical records to assess the effectiveness of a CT image-guided transgluteal approach for percutaneous drainage of deep pelvic abscesses as an alternative to surgical drainage.	Percutaneous CT-guided transgluteal drainage is a safe and effective alternative to surgery for deep pelvic abscesses. Major complications are rare.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
61. Lee BC, McGahan JF, Bijan B. Single-step transvaginal aspiration and drainage for suspected pelvic abscesses refractory to antibiotic therapy. <i>J Ultrasound Med.</i> 2002;21(7):731-738.	Observational-Tx	22 patients	Retrospective review to evaluate the effectiveness and safety of US-guided transvaginal aspiration with the trocar technique in suspected pelvic abscesses that were refractory to antibiotic treatment.	Drainage catheters were placed in 15 (68%) of the 22 patients and left in place an average of 3.7 days. Aspiration alone resulted in a 100% success rate, whereas drainage with catheter placement resulted in an 80% success rate. Transvaginal US-guided aspiration or catheter placement with the trocar technique is a safe and effective treatment for suspected pelvic abscesses refractory to antibiotic therapy.	2
62. Nelson AL, Sinow RM, Oliak D. Transrectal ultrasonographically guided drainage of gynecologic pelvic abscesses. <i>Am J Obstet Gynecol.</i> 2000;182(6):1382-1388.	Review/Other-Tx	15 patients	Retrospective review to assess the feasibility of US-guided transrectal aspiration of gynecologic pelvic abscesses to treat patients for whom IV antibiotic therapies failed and whose abscesses were not optimally amenable to colpotomy drainage or transabdominal or transvaginal US-guided aspiration.	US-guided transrectal drainage of gynecologic pelvic abscesses is a safe and effective treatment of pelvic abscesses for women who do not have an adequate response to antibiotic therapy.	4
63. Sperling DC, Needleman L, Eschelmann DJ, Hovsepian DM, Lev-Toaff AS. Deep pelvic abscesses: transperineal US-guided drainage. <i>Radiology.</i> 1998;208(1):111-115.	Observational-Tx	11 patients	To examine the efficacy of transperineal US-guided drainage of deep pelvic abscesses.	Clinical success was achieved in 9/10 patients (90%) by means of transperineal drainage. There were no complications, although premature catheter removal occurred in 2 patients. US-guided transperineal abscess drainage may be successfully performed in patients who cannot undergo conventional transabdominal, transvaginal, or transrectal catheter drainage.	3
64. Jaffe TA, Nelson RC, Delong DM, Paulson EK. Practice patterns in percutaneous image-guided intraabdominal abscess drainage: survey of academic and private practice centers. <i>Radiology.</i> 2004;233(3):750-756.	Review/Other-Dx	N/A	To evaluate current practice patterns of percutaneous image-guided abdominal and pelvic abscess drainage in academic and private practice centers. 493 questionnaires were sent to 193 academic and 300 private practice radiology departments in the United States.	Percutaneous drainage is usually performed by fellowship-trained radiologists in abscesses of >3 cm in diameter, for appropriate clinical indications (multiple parameters above the established threshold), by using conscious sedation and 8-12-F catheters.	4

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
65. Puri R, Eloubeidi MA, Sud R, Kumar M, Jain P. Endoscopic ultrasound-guided drainage of pelvic abscess without fluoroscopy guidance. <i>J Gastroenterol Hepatol.</i> 2010;25(8):1416-1419.	Review/Other-Tx	14 patients	To evaluate the clinical efficacy of EUS-guided transrectal/transcolonic drainage of pelvic abscess without fluoroscopy.	14 consecutive patients were enrolled. EUS-guided aspiration was performed in 3 patients. In 2 patients, dilatation and aspiration was performed, while trans-rectal stent was placed in 9 patients. All patients became afebrile within 72 hours. Stent was removed in all patients, after confirming the resolution of the abscess on repeat CT after 7 days. One patient in whom only aspiration was done had recurrence of fever and abscess on the seventh day and was treated by surgical drainage. A follow-up EUS done in 13 of the patients after 3 months revealed no recurrence, and all patients were asymptomatic at 6 months. The procedure was uneventful in all patients.	4
66. Garg CP, Vaidya BB, Chengalath MM. Efficacy of laparoscopy in complicated appendicitis. <i>Int J Surg.</i> 2009;7(3):250-252.	Observational-Tx	110 consecutive patients	To evaluate the efficacy of laparoscopic appendectomy in patients with complicated appendicitis.	There were 2 conversions due to extremely friable appendix. Laparoscopic appendectomy took longer to perform (98 min vs 79 min) but was associated with less analgesic use, shorter median hospital stay (laparoscopic appendectomy - 3 days; open appendectomy - 6 days, $P<0.05$), and lower rate of wound infections (laparoscopic appendectomy, 8.2%; open appendectomy, 24.6 %, $P<0.05$). Intra-abdominal abscess occurred in 4 patients (8.2%) in laparoscopic appendectomy group and 14 patients (22.9%) in open appendectomy group ($p<0.05$). More patients in open appendectomy group experienced prolonged ileus than laparoscopic appendectomy group but the difference was statistically insignificant. All complications were managed conservatively and there was no mortality in either group.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
67. Greenstein Y, Shah AJ, Vragovic O, et al. Tuboovarian abscess. Factors associated with operative intervention after failed antibiotic therapy. <i>J Reprod Med.</i> 2013;58(3-4):101-106.	Observational-Tx	163 patients	To evaluate whether size of TOA and other clinical characteristics were associated with the need for surgical intervention.	A total of 163 patients with TOA were identified; 41 patients were excluded based on specific criteria. Of the remaining 122 women, 65.6% responded to antibiotic therapy, and 34.4% had surgery or US-guided drainage. Mean TOA size in the medical group was 4.4 cm as compared to 7.3 cm in the surgical group (P<0.0001). Maximal leukocyte count, older age, and parity were associated with significantly higher risk of surgery. The significant univariate variables remained significant after multivariate analysis. ROC curve analysis revealed an excellent discrimination of the need for surgical treatment as predicted by TOA size, with increased likelihood of surgical or procedural intervention with increasing TOA size.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
68. Levenson RB, Pearson KM, Saokar A, Lee SI, Mueller PR, Hahn PF. Image-guided drainage of tuboovarian abscesses of gastrointestinal or genitourinary origin: a retrospective analysis. <i>J Vasc Interv Radiol.</i> 2011;22(5):678-686.	Observational-Tx	57 TOAs drained in 49 female patients	To analyze the authors' success with image-guided drainage of TOAs.	33 (58%) TOAs were drained percutaneously using CT guidance and 24 were US-guided (21 transvaginally, 3 transabdominally). 53 TOAs were drained with catheter placement, and 4 were drained with aspiration alone. Abscess etiologies include pelvic inflammatory disease (n = 21, 37%), gastrointestinal conditions related (n = 21, 37%), gynecologic surgery (n = 8, 14%), and other (12%). Image-guided drainage resolved TOAs without salpingo-oophorectomy in 74% of cases overall (42/57) and 88% (29/33) of gynecologic-related cases, including 95% (20/21) of pelvic inflammatory disease cases. Salpingo-oophorectomy was performed more often in gastrointestinal-related cases (10/21, 48%) than for all other causes (5/36, 14%; P<.001), with concurrent bowel surgery performed in the majority of the gastrointestinal-related cases. Mean follow-up after image-guided drainage was 48 months (range, 1-113) in patients who did not have related surgery. In patients who underwent salpingo-oophorectomy, it was performed on average 2.2 months (range, 0.5-5) after initial drainage. 2 minor complications occurred; both involved catheter transgression of the urinary bladder in patients with transvaginal US-guided drainages. The patients were successfully treated conservatively with Foley catheter bladder decompression, without prolonged hospitalization.	2

**Radiologic Management of Infected Fluid Collections
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
69. Rosen M, Breitkopf D, Waud K. Tubo-ovarian abscess management options for women who desire fertility. <i>Obstet Gynecol Surv.</i> 2009;64(10):681-689.	Review/Other-Tx	N/A	A MEDLINE search and extensive review of published literature was undertaken to study management options for patients with TOA, and to compare rates of responders, pregnancies and complications associated with each management option.	If intra-abdominal rupture is suspected, and patients are treated with fertility-preserving, conservative surgery, reported pregnancy rate is 25%. If no rupture is suspected and patients are treated with medical management alone, reported pregnancy rates vary between 4% and 15%. If no rupture is suspected, and the treatment is medical management with immediate laparoscopic drainage within 24 hours, reported pregnancy rates vary between 32% and 63%. Laparoscopy should be considered to all patients with TOA who desire future conception. Overall, the advantages of immediate laparoscopy allow for an accurate diagnosis, effective treatment under magnification with minimal complications, possibly faster response rates with shorter hospitalization times and decreased infertility.	4
70. Gjelland K, Granberg S, Kiserud T, Wentzel-Larsen T, Ekerhovd E. Pregnancies following ultrasound-guided drainage of tubo-ovarian abscess. <i>Fertil Steril.</i> 2012;98(1):136-140.	Observational-Tx	38 women	To study fertility among women treated by means of US-guided drainage and antibiotics for TOA.	20/38 (52.6%; 95% CI, 36.5%–68.9%) women who intended to have a child achieved pregnancy naturally and became mothers. In addition, 7 (50%) of 14 women who were not on birth control on a regular basis became pregnant. No ectopic pregnancies were registered.	2
71. Chou YH, Tiu CM, Liu JY, et al. Prostatic abscess: transrectal color Doppler ultrasonic diagnosis and minimally invasive therapeutic management. <i>Ultrasound Med Biol.</i> 2004;30(6):719-724.	Review/Other-Dx	13 patients	To analyze the transrectal US, or transrectal US, and color Doppler US findings and therapeutic strategies with transrectal US-guided procedures in patients with prostatic abscess. The transrectal color Doppler US findings were correlated to the treatment effects.	Transrectal color Doppler US may help in the evaluation of maturity of an abscess pocket. US-guided aspiration with an 18-gauge needle or drainage with a 5-French pigtail catheter significantly shortened the hospital stay.	4

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
 - a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
 - b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
 - c) the study is an expert opinion or consensus document.

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

CI = Confidence interval

CT = Computed tomography

EUS = Endoscopic ultrasound

HAE = Hepatic artery embolization

IV = Intravenous

OSD = Open surgical drainage

PAD = Percutaneous abscess drainage

PCD = Percutaneous catheter drainage

TOA = Tubo-ovarian abscess

tPA = Tissue-type plasminogen activator

US = Ultrasound