

**Percutaneous Catheter Drainage of Infected Intra-abdominal Fluid Collections**  
**EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Neff CC, Simeone JF, Ferrucci JT, Jr., Mueller PR, Wittenberg J. The occurrence of fluid collections following routine abdominal surgical procedures: sonographic survey in asymptomatic postoperative patients. <i>Radiology</i> 1983; 146(2):463-466.	3a	80	Prospective sonographic survey to examine the frequency and appearance of reactive effusions following routine abdominal surgery procedures.	Serial scans on the 4th, 8th, and 12th postoperative days disclosed localized abdominal fluid collections in 19% (15/80), 6% (5/80), and 2.5% (2/80) of cases, respectively. Abscess was the only collection that enlarged.	2
2. 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.	15	N/A	Practice guideline.	N/A	N/A
3. Olak J, Christou NV, Stein LA, Casola G, Meakins JL. Operative vs percutaneous drainage of intra-abdominal abscesses. Comparison of morbidity and mortality. <i>Arch Surg</i> 1986; 121(2):141-146.	3b	27 PD abscesses 27 SD abscesses	Retrospective case controlled study to compare the morbidity and mortality of 27 percutaneously drained (PD) abscesses with 27 that were surgically drained (SD).	<ul style="list-style-type: none"> <li>• There was no difference in severity of illness (acute physiology score [APS] = 8.3 vs 10.2), comparable morbidity (29.6% vs 40.7%), or mortality (11.0% vs 7.4%) between PD and SD groups. Duration of drainage was significantly longer in the PD group; however, this is explained in part by the 48% vs 18.5% difference in associated fistulae.</li> <li>• Failures of the SD group had a higher mean APS (15) than both failures of the PD group (APS = 9.3) and successes of the SD group (APS = 8.6).</li> <li>• All three PD group deaths and half of the SD group deaths were related to ongoing sepsis. Surgical drainage of intra-abdominal abscess is as successful as PD.</li> </ul>	3
4. 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.	3a	212	To summarize the results, failures and complications of percutaneous abscess and fluid drainage procedures. Also, analysis and corrective measures of these problems are discussed.	<ul style="list-style-type: none"> <li>• In 209 cases, operation was avoided and the patients were cured (83.6%). Partial success was achieved in 18/41 recurrences and failures.</li> <li>• 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%).</li> <li>• 26 patients experienced complications (10.4%), seven of which were major (2.8%).</li> </ul>	3

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5. 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.	7	114	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.	3
6. Siewert B, Tye G, Kruskal J, et al. Impact of CT-guided drainage in the treatment of diverticular abscesses: size matters. <i>AJR</i> 2006; 186(3):680-686.	7	181	To evaluate CT for the presence of an abscess, its location, maximum diameter, and feasibility of percutaneous abscess drainage and to determine whether abscess size can be used as a discriminating factor to guide management of patients with diverticular abscesses.	<ul style="list-style-type: none"> <li>• Patients with abscesses &lt;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.</li> <li>• Patients with abscesses ≥4 cm can be managed with CT-guided abscess drainage followed by referral for surgical treatment.</li> </ul>	3
7. 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.	4	32	To evaluate management of postoperative peritonitis after anterior resection. All patients referred to a surgical intensive care unit during the past ten 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.	3
8. 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.	3a	121 abscesses	To examine cases of percutaneous catheter drainage (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.	3

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9. 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.	3a	96	Multicenter prospective study of patients who had intra-abdominal infections treated with PCD and intravenous 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.	2
10. 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.	3a	40	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
11. Poritz LS, Koltun WA. Percutaneous drainage and ileocectomy for spontaneous intraabdominal abscess in Crohn's disease. <i>J Gastrointest Surg</i> 2007; 11(2):204-208.	7	19	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 one 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.	3
12. 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.	7	32	Review medical records of patients to determine technical success with percutaneous abscess drainage (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.	3
13. 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.	3b	66 abscesses	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.	3

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14. 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.	3a	6,439	Retrospective study to evaluate outcomes for children treated without interval appendectomy (IA) after successful nonoperative management of perforated appendicitis.	Recurrent appendicitis is rare in pediatric patients after successful nonoperative management of perforated appendicitis. Routine IA is not necessarily indicated for these children.	2
15. 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.	7	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.	2
16. 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.	7	140	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
17. 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.	7	22	Retrospective review to evaluate the effectiveness and safety of sonographically 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 ultrasonographically (TVS) guided aspiration or catheter placement with the trocar technique is a safe and effective treatment for suspected pelvic abscesses refractory to antibiotic therapy.	3
18. 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.	7	15	Retrospective review to assess the feasibility of ultrasonographically (US) guided transrectal aspiration of gynecologic pelvic abscesses to treat patients for whom intravenous antibiotic therapies failed and whose abscesses were not optimally amenable to colpotomy drainage or transabdominal or TVS 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.	3
19. 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.	3a	11	To examine the efficacy of transperineal sonographically guided drainage of deep pelvic abscesses.	Clinical success was achieved in 9 of 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

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20. 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.	15	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.	2
21. Fabiszewski NL, Sumkin JH, Johns CM. Contemporary radiologic percutaneous abscess drainage in the pelvis. <i>Clin Obstet Gynecol</i> 1993; 36(2):445-456.	7	N/A	To review contemporary radiologic PAD in the pelvis.	Initial results of PAD treatment of tuboovarian abscess (TOA) are encouraging, suggesting that this procedure, just as elsewhere in the abdomen is safe and effective, but larger series are required and long-term follow-up is necessary for evaluation of the cure rate, rate of recurrence, and possible complications.	4
22. 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.	7	13	To analyze the transrectal US, or TRUS, and color Doppler US (CDU) findings and therapeutic strategies with TRUS-guided procedures in patients with prostatic abscess. The transrectal CDU findings were correlated to the treatment effects.	Transrectal CDU 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.	3
23. 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.	7	36	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.	3
24. Stain SC, Yellin AE, Donovan AJ, Brien HW. Pyogenic liver abscess. Modern treatment. <i>Arch Surg</i> 1991; 126(8):991-996.	7	54	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. Open surgical drainage is reserved for patients in whom treatment fails or who require celiotomy for concurrent disease.	3
25. Donovan AJ, Yellin AE, Ralls PW. Hepatic abscess. <i>World J Surg</i> 1991; 15(2):162-169.	7	N/A	To review diagnosis and treatment of hepatic abscess.	US is the modality of choice and will detect almost 100% of abscesses. In the treatment of an amebic liver abscess, metronidazole is the amebicide of choice. For cases that fail to respond to therapy with amebicides, closed drainage guided by CT or US is performed.	4

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26. Pitt HA. Surgical management of hepatic abscesses. <i>World J Surg</i> 1990; 14(4):498-504.	7	N/A	To review surgical management of hepatic abscesses.	Majority of pyogenic liver abscesses are caused by infections in the biliary or intestinal tracts. These lesions can be differentiated on clinical grounds and by amebic serology. US and CT are the imaging techniques of choice. The initial management of amebic hepatic abscesses is treatment with amebicidal agents.	4
27. 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.	7	67	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 (GNB) infection (P=0.009) and multiple abscesses (P=0.011) experienced a higher mortality rate than patients with gram positive coccus (GPC) 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 (MSA), GNB infection, and high APACHE II scores are poor prognostic factors. Early surgical intervention should be encouraged when these risk factors are present.	2
28. Tung CC, Chen FC, Lo CJ. Splenic abscess: an easily overlooked disease? <i>Am Surg</i> 2006; 72(4):322-325.	7	51	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 intravenous antibiotics alone.	3
29. 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.	15 (consensus development conference)	40 international authorities from 6 medical disciplines and 15 countries	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.	1
30. Bradley EL, 3rd. A clinically based classification system for acute pancreatitis. <i>Ann Chir</i> 1993; 47(6):537-541.	15 (consensus development conference)	40 experts	International symposium to establish a clinically based classification system for acute pancreatic that will be useful to practitioners, academicians and the entire medical profession.	Participants attempted to create an ideal classification system for acute pancreatitis that would be simple, objective, quantitative, and non invasive.	1

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31. 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.	3a	35	To evaluate a new drainage technique for pancreatic pseudocysts or pancreatic abscesses entirely guided by endoscopic US (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
32. 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.	2	85	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: <ul style="list-style-type: none"> <li>• The procedures can be carried out under US guidance in an intensive care unit on critically ill patients,</li> <li>• The technique proved highly effective for initial palliation, with defervescence and stabilization occurring in most critically ill patients within 48 hours,</li> <li>• Findings from fine needle aspiration provided valuable information as to microorganisms and antibiotic sensitivities and differed in 29 of 85 patients from those of concomitant blood cultures,</li> <li>• Definitive eradication of the process (surgical ablation of residual necrotic material) can be elected after the patient's clinical condition stabilizes.</li> </ul>	2
33. Mithofer K, Mueller PR, Warshaw AL. Interventional and surgical treatment of pancreatic abscess. <i>World J Surg</i> 1997; 21(2):162-168.	4	39	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
34. 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.	5	9 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.	4
35. 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.	4	14	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

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36. Bradley EL, 3rd, Olson RA. Current management of pancreatic abscess. <i>Adv Surg</i> 1991; 24:361-388.	7	N/A	To review management of pancreatic abscess.	Finding a means to prevent secondary infection of necrotizing pancreatitis would have a very significant impact on survival. Defining the various forms of severe acute pancreatitis and its infectious complications by dynamic pancreatography and CT-directed aspiration will permit meaningful trials of new methods to treat patients.	4
37. Steiner E, Mueller PR, Hahn PF, et al. Complicated pancreatic abscesses: problems in interventional management. <i>Radiology</i> 1988; 167(2):443-446.	4	25	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.	3
38. 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.	4	22	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
39. 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.	7	65	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.	3
40. 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.	13	88	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 two 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, $2.8 \pm 2.9$ days; $P < .01$ ) and the blood urea nitrogen level was higher in group 1 ( $55.7 \pm 42.2$ mg/dL, vs group 2, $33.5 \pm 33.5$ mg/dL; $P = .02$ ).	2

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41. 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.	3a	252	To analyze the management of patients with aspiration lung abscess.	<ul style="list-style-type: none"> <li>Lung abscess occurred predominantly in male adults presenting dental disease and having a history of loss of consciousness.</li> <li>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.</li> <li>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.</li> </ul>	2
42. 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.	3a	66	To retrospectively determine the effectiveness of and risk for hemorrhage with intrapleural adjunctive tissue plasminogen activator (tPA) administered via chest tubes placed with imaging guidance.	Fifty-seven (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 five (83%) of six. 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.	2
43. 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.	3a	32	To determine the value of small-bore-catheter thoracostomy and talc pleurodesis in the treatment of malignant pleural effusions.	Twenty-three patients (72%) had a complete response; four (12%), a partial response; and five (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 six (19%). Small-bore-catheter thoracostomy and talc pleurodesis was successful in treating malignant pleural effusions.	2

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44. 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.	3a	202	To determine the value of the Pleur(x) catheter in treating patients with malignant pleural effusions.	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.	2
45. Kok KY, Yapp SK. Laparoscopic drainage of postoperative complicated intra-abdominal abscesses. <i>Surg Laparosc Endosc Percutan Tech</i> 2000; 10(5):311-313.	5	7	Retrospective review to determine effectiveness of laparoscopic drainage in the treatment of patients with postoperative complicated intra-abdominal abscesses.	Laparoscopic drainage, in combination with systemic antibiotics, is a safe and effective treatment option in patients with postoperative complicated intra-abdominal abscesses.	4
46. 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.	3a	43 46 abscesses	To retrospectively evaluate the effectiveness and safety of tissue-type plasminogen activator (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
47. 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.	1	65 68 cysts	To compare the efficacy and side effects of ethanol and sodium tetradecyl sulfate (STDS) as sclerosants for symptomatic simple renal cyst.	Ethanol and STDS are simple, noninvasive, cost-effective, and well-tolerated sclerosants for the treatment of simple renal cysts. Prefer STDS as a first choice because it causes less pain (pain score $2.1 \pm 1.1$ v $3.8 \pm 1.2$ for ethanol; $P=0.019$ ).	2
48. 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</i> 1991; 157(6):1209-1212.	3b	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.	<ul style="list-style-type: none"> <li>Duration of drainage was longer (<math>P&lt;.05</math>) in patients with communication (range, 7-44 days; mean, 22 days) than in patients without communication (range, 1-33 days; mean, 13 days).</li> <li>Percutaneous drainage was curative in five (63%) and palliative or temporizing in one (13%) of eight patients with communication. It was curative in 15 (68%) and palliative or temporizing in five (23%) of 22 patients without communication (<math>P=.317</math>).</li> </ul>	3
49. 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.	3a	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.	3

**Percutaneous Catheter Drainage of Infected Intra-abdominal Fluid Collections**  
**EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
50. Wittich GR. Radiologic treatment of abdominal abscesses with fistulous communications. <i>Curr Opin Radiol</i> 1992; 4(4):110-115.	7	N/A	To review advances and persisting limitations of percutaneous radiologic drainage of abdominal abscesses.	No results stated.	4
51. Mueller PR, White EM, Glass-Royal M, et al. Infected abdominal tumors: percutaneous catheter drainage. <i>Radiology</i> 1989; 173(3):627-629.	3a	16	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.	3

## Evidence Table Key

### Study Type Key

*Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.*

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
  - a. Cohort
  - b. Cross-sectional
  - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews
  
8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

### Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.