

60 metabolic control as a determinant of disease severity,
 61 progression, and response to treatment. Furthermore, they
 62 emphasize the importance of early computed tomography
 63 (CT), microbiological confirmation, and individualized
 64 management strategies to prevent delays in diagnosis,
 65 inappropriate therapies, and potentially preventable com-
 66 plications, such as septic shock, diabetic ketoacidosis
 67 (DKA), and the need for surgical intervention. By con-
 68 tributing to the limited literature on non-tuberculous pul-
 69 monary cavitations in patients with diabetes, this case
 70 series reinforces the need for a high index of suspicion
 71 and a multidisciplinary approach to their evaluation and
 72 management.“

73 Case Description

74 Case 1

75 A 22-year-old woman with a history of T2DM treated with
 76 metformin/liraglutide with suboptimal adherence, morbid
 77 obesity (BMI 42 kg/m²), and polycystic ovary syndrome
 78 presented with general malaise, retro-orbital headache,
 79 and persistent fever lasting 10 days. Dengue infection was
 80 confirmed by a positive NS1 antigen test. After an initial
 81 clinical improvement, she developed right-sided chest
 82 pain, progressive exertional dyspnea, and high-grade
 83 fever (39.8°C), prompting her to seek emergency care.

84 On admission, vital signs were as follows: heart rate 110
 85 bpm, blood pressure 127/63 mmHg, temperature 38.2°C,
 86 oxygen saturation 91% on room air, and blood glucose

250 mg/dl. Physical examination revealed generalized 87
 petechiae and crackles over the right hemithorax, asso- 88
 ciated with increased tactile vocal fremitus. Laboratory 89
 evaluation showed grade II hypochromic microcytic ane- 90
 mia (Hb 8.9 g/dl), marked leukocytosis (20,640/μl; 85% 91
 neutrophils, 20% bands), hyperglycemia, hyponatremia 92
 (133 mEq/l), significantly elevated C-reactive protein 93
 (150 mg/l), and respiratory alkalosis; additionally, gly- 94
 cated hemoglobin (HbA1c) was requested as part of the 95
 diagnostic workup and was reported at 6.8%. 96

Chest CT revealed a cavitory lesion in the right upper 97
 lobe with an air–fluid level, associated with parenchymal 98
 consolidation and ipsilateral pleural effusion (Figure 1). 99
 Given the patient’s clinical presentation, sputum culture 100
 and Gram staining were performed, which demonstrated 101
 the presence of yeasts, with isolation of *Candida albicans*. 102
 Additionally, three consecutive sputum samples for acid- 103
 fast bacilli smear were reported as negative. 104

In the absence of sepsis or organ dysfunction (SOFA 105
 score 0), conservative management was initiated in a gen- 106
 eral ward with intravenous ceftriaxone 1 g every 12 hours 107
 and metronidazole 500 mg every 6 hours. Furthermore, 108
 due to the mycological isolation, antifungal therapy with 109
 fluconazole was initiated at 400 mg on the first day, fol- 110
 lowed by 200 mg every 24 hours thereafter, along with 111
 optimization of metabolic control using rapid-acting insu- 112
 lin and close monitoring, resulting in a favorable clinical 113
 outcome. 114



115
 116 **Figure 1.** CT of the chest. It shows a cavitory lesion located in the posterior segment of
 117 the right upper lobe, with an internal air-fluid level (red arrow), associated with peripheral
 118 parenchymal consolidation and inflammatory bronchial changes. Right pleural effusion
 119 and mediastinal lymphadenopathy are also observed.

120 *Case 2*

121 A 68-year-old man with a history of T2DM treated with
122 metformin and untreated chronic obstructive pulmonary
123 disease presented with general malaise, productive
124 cough, exertional dyspnea, and fever of 5 days' duration.
125 Initial chest CT demonstrated consolidation in the right
126 upper lung lobe, leading to a diagnosis of community-ac-
127 quired pneumonia. Empirical antibiotic therapy was initi-
128 ated, with initial clinical improvement allowing hospital
129 discharge.

130 Seventy-two hours after discharge, the patient devel-
131 oped rapidly progressive dyspnea and altered mental
132 status and was readmitted to the emergency department.
133 Severe (DKA; pH 6.80, glucose 397 mg/dl, HCO₃⁻ 1.2
134 mmol/l) and septic shock were diagnosed. On evaluation,
135 oxygen saturation was 74%, with partial improvement
136 after supplemental oxygen at 4 l/min; capillary glucose
137 was 342 mg/dl. Physical examination revealed dry oral
138 mucosa, cold and clammy skin, right-sided thoracic crack-
139 les, and delayed capillary refill.

140 Laboratory tests showed mild normocytic normochro-
141 mic anemia (Hb 10.1 g/dl), leukocytosis (16,870/μl; 86%
142 neutrophils, 20% bands), acute kidney injury (creatinine
143 2.0 mg/dl), hypernatremia (155 mEq/l), severe hypo-
144 kalemia (2.5 mEq/l), and high anion gap metabolic acido-
145 sis. Chest CT revealed an extensive cavitary lesion in the
146 right upper lobe (Figure 2). Sputum culture grew *Serratia*

marcescens (40,000 CFU), allowing targeted antimicro- **147**
 bial therapy with piperacillin–tazobactam at a dose of 4.5 **148**
 g every 8 hours for 8 days. Due to clinical deterioration **149**
 and lesion extent, the patient required intensive care unit **150**
 management, broad-spectrum intravenous antibiotics, **151**
 and surgical intervention with lobectomy; following the **152**
 lobectomy, the patient was admitted to the intensive care **153**
 unit and subsequently demonstrated a favorable clinical **154**
 course (Figure 3). **155**

Case comparison **156**

Both patients shared poorly controlled T2DM, pulmo- **157**
 nary cavitations localized to the right upper lobe, anemia, **158**
 neutrophilic leukocytosis, and electrolyte and acid–base **159**
 disturbances, with negative sputum smear microscopy for **160**
Mycobacterium tuberculosis. However, marked differ- **161**
 ences were observed in age, comorbidities, initial clini- **162**
 cal presentation, and disease severity. Case 1 involved **163**
 a young patient without sepsis or organ dysfunction, in **164**
 whom conservative management was successful. In con- **165**
 trast, Case 2 involved an older patient with severe com- **166**
 plications, including DKA and septic shock (SOFA score **167**
 7), requiring intensive care management and surgical **168**
 intervention. These cases highlight the clinical hetero- **169**
 geneity of pulmonary cavitations in patients with poorly **170**
 controlled T2DM and underscore the importance of indi- **171**
 vidualized evaluation and management strategies. **172**



Figure 2. CT of the chest. It reveals an extensive cavitary lesion located in the right upper lobe, containing an air-fluid level, approximately 12 × 9 × 6 cm in diameter (red arrow).

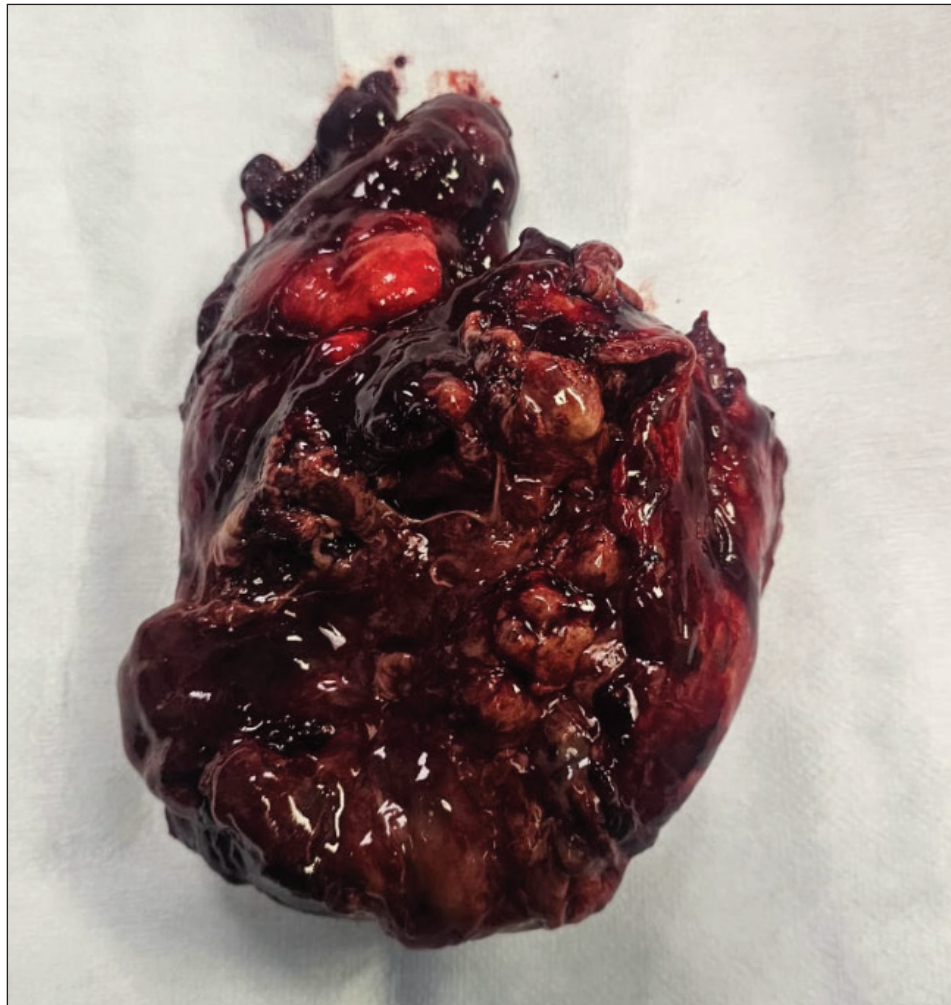


Figure 3. Right pulmonary lobectomy specimen (15 × 13 × 8 cm) showing extensive abscess formation with loss of normal architecture and hemorrhagic areas, consistent with acute necrotizing abscessed pneumonia; no malignancy identified.

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180 Discussion

181 A lung abscess is a serious respiratory infection character- 201
182 ized by a cavitated pulmonary lesion containing purulent 202
183 material and necrotic tissue [3]. It most commonly devel- 203
184 ops as a complication of aspiration pneumonia; therefore, 204
185 aspiration of large volumes of oropharyngeal secretions in 205
186 patients with impaired consciousness represents a major 206
187 risk factor. Additional predisposing conditions include 207
188 structural lung diseases – such as lung malignancies 208
189 and chronic obstructive pulmonary disease – poor oral 209
190 hygiene, and immunosuppressive states [4]. Uncontrolled 210
191 diabetes mellitus causes the patient to be immunocompro- 211
192 mised and can be a predisposing factor for other diseases, 212
193 especially infectious diseases, researchers reported a 50% 213
194 increase in the risk of Community-acquired pneumonia 214
195 among patients with Diabetes mellitus (DM) [5]. 215

196 Pneumonia is common in patients with uncontrolled 216
197 diabetes mellitus. Based on the literature, hyperglycemia 217
198 causes an increase in oxidative stress and disturbances 218
199 in the immune system, like delaying hypersensitivity 219
200 reactions, lymphocyte transformation, and granuloma 220

formation, which results in changes in immune mecha- 201
nisms so that DM patients are more susceptible to pneu- 202
monia [6]. 203

Lung abscesses are traditionally classified as primary 204
when they result from aspiration of oropharyngeal secre- 205
tions, and as secondary when they occur in the context 206
of underlying pulmonary disease, bronchial obstruction, 207
or hematogenous dissemination from extrapulmonary 208
infections. Based on their clinical course, abscesses may 209
also be categorized as acute, resolving within 6 weeks, 210
or chronic, persisting beyond this period [7]. In adults, 211
lung abscesses most frequently present between 55 and 75 212
years of age, with a mean age of approximately 65 years, 213
and show a male predominance, accounting for nearly 214
65% of cases. The most common symptoms at presenta- 215
tion include cough, malaise, and fever. Lesions typically 216
measure around 5 cm in diameter and are most often 217
located in the right upper or lower lobes [8]. 218

From a diagnostic perspective, the presence of an 219
underlying pulmonary malignancy should always be 220
considered in patients with lung abscesses, as reported 221

222 prevalence ranges from approximately 7% to higher val-
 223 ues depending on the studied population and diagnostic
 224 approach [9]. CT remains the gold standard for diagnosis;
 225 however, clinical correlation is essential, as differentiat-
 226 ing a lung abscess from infectious cysts or other cavitary
 227 lung lesions can be challenging. Thoracic ultrasound has
 228 emerged as a valuable, accessible imaging modality that
 229 provides real-time assessment and may be particularly
 230 useful during the initial evaluation [10].

231 Identification of the causative microorganism is crucial
 232 to optimize antimicrobial therapy and limit unnecessary
 233 use of broad-spectrum antibiotics; nonetheless, sputum
 234 cultures yield positive results in only approximately 50%
 235 of cases [11]. In patients who fail to respond to systemic
 236 antibiotic therapy, escalation to invasive management
 237 should be considered. Factors associated with failure of
 238 conservative treatment include endobronchial obstruction
 239 due to tumors or foreign bodies, cavitary lesions second-
 240 ary to malignancy or vasculitis, inappropriate antibiotic
 241 selection or insufficient treatment duration, and abscesses
 242 larger than 6 cm. In such scenarios, percutaneous transtho-
 243 racic drainage and endoscopic catheter drainage represent
 244 effective alternatives to conventional surgical resection
 245 [12].

246 In the present case series, poorly controlled T2DM
 247 played a central role in the development and progression
 248 of lung abscesses. Differences in age and comorbidity
 249 burden likely explain the variation in disease severity
 250 observed between the two patients. Early use of CT for
 251 timely diagnosis, prompt initiation of insulin therapy
 252 to achieve glycemic control, and appropriate intrave-
 253 nous antibiotic therapy were key factors associated with
 254 favorable clinical outcomes. This series contributes to the
 255 limited existing literature on lung abscesses in diabetic
 256 patients and underscores the importance of a multidisci-
 257 plinary approach to improve outcomes in this high-risk
 258 population.

259 Conclusion

260 Pulmonary cavitations in patients with poorly controlled
 261 T2DM represent a complex diagnostic and therapeutic
 262 challenge, particularly in regions where tuberculosis is
 263 endemic and cavitary pulmonary lesions are frequently
 264 presumed to be of tuberculous origin. The presentation of
 265 these two cases illustrates the clinical spectrum of non-tu-
 266 berculous pulmonary cavitations in diabetic patients,
 267 ranging from favorable outcomes with conservative treat-
 268 ment to severe cases requiring intensive care and surgical
 269 intervention. Poor metabolic control, advanced age, and
 270 the presence of comorbidities appear to play a fundamen-
 271 tal role in disease severity and clinical progression. Early
 272 diagnosis, timely imaging acquisition (particularly CT),
 273 adequate glycemic control, and targeted antimicrobial
 274 therapy are essential to optimize outcomes. A multidisci-
 275 plinary approach is crucial to prevent diagnostic delays,

guide appropriate treatment strategies, and reduce mor- 276
 bidity and mortality in this high-risk population. 277

What is new?

- This case series highlights that pulmonary cavitations 278
 in patients with poorly controlled T2DM may occur fol- 279
 lowing non-tuberculous infectious processes, even in 280
 tuberculosis-endemic regions where cavitary lesions are 281
 commonly presumed to be tuberculous in origin. 282
 • It illustrates the heterogeneous clinical spectrum of 283
 non-tuberculous pulmonary cavitations in diabetic 284
 patients, ranging from favorable outcomes with conserv- 285
 ative medical management to severe disease complicated 286
 by DKA, septic shock, and the need for surgical lobectomy. 287
 • The report emphasizes the central role of poor metabolic 288
 control as a key modifier of disease severity, progression, 289
 and outcome in pulmonary cavitary infections, independ- 290
 ent of patient age or initial clinical presentation. 291
 292

List of Abbreviations

CAP	Community-acquired pneumonia	294
COPD	Chronic obstructive pulmonary disease	295
CT	Computed tomography	296
DKA	Diabetic ketoacidosis	297
ICU	Intensive care unit	298
HbA1c	Glycated haemoglobin	299
CRP	C-reactive protein	300
SOFA	Sequential Organ Failure Assessment	301
T2DM	Type 2 diabetes mellitus	302

Conflict of interest

The authors declare that they have no conflict of interest 303
 regarding the publication of this manuscript. 304
 305

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Consent for publication

Written informed consent was obtained from the patient for 308
 the publication of this case, including clinical information and 309
 accompanying images. 310
 311

Ethical approval

Ethical approval was not required for this case report in accord- 312
 ance with institutional policies; however, all applicable ethical 313
 standards and guidelines for research involving human subjects 314
 were fully adhered to. 315
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Summary of the case

ITEM	CASE 1	CASE 2
Age/sex	22-year-old female	68-year-old male
Medical history	Poorly controlled T2DM, morbid obesity (BMI 42 kg/m ²), polycystic ovary syndrome	Poorly controlled T2DM, chronic obstructive pulmonary disease
Presentation	Fever following recent dengue infection, right-sided chest pain, exertional dyspnea	Productive cough, dyspnea, fever; rapid deterioration after initial discharge
Key findings	Leukocytosis with neutrophilia and bandemia; anemia; elevated CRP; hyperglycemia; chest CT showing right upper lobe cavitory lesion with air–fluid level and pleural effusion	Severe DKA, septic shock, acute kidney injury; leukocytosis; electrolyte disturbances; chest CT showing extensive right upper lobe pulmonary cavitation
Diagnostic workup	Negative sputum smear microscopy for <i>Mycobacterium tuberculosis</i> ; CT findings consistent with cavitory pneumonia	Negative sputum smear microscopy for <i>Mycobacterium tuberculosis</i> ; sputum culture positive for <i>Serratia marcescens</i>
Diagnosis	Non-tuberculous cavitory pneumonia	Lung abscess secondary to <i>Serratia marcescens</i> pneumonia complicated by DKA and septic shock
Management	Intravenous antibiotics, optimization of glycemic control, close monitoring in general ward	Intensive care unit admission, insulin infusion, broad-spectrum intravenous antibiotics, electrolyte correction, surgical right upper lobectomy
Outcome	Favorable clinical evolution with complete resolution	Clinical improvement after surgical and medical management