

Necrotizing Fasciitis Complicating Acute Appendicitis in the Era of COVID19: Case Report and Review of Literature

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Keywords:

Necrotizing Fasciitis; Acute Appendicitis; Perforation

Abbreviations:

NF: Necrotizing Fasciitis

1. Abstract: Introduction: acute appendicitis is a common disease with a low rate of mortality. Rarely can it lead to serious complications such as Necrotizing Fasciitis (NF). Herein we describe a new case of NF complicating acute appendicitis and throw a review of English literature we studied epidemiological and clinical features of this entity.

1.1. Case: A 69-year-old man was admitted for abdominal pain with vomiting, constipation, and anorexia for the past two weeks. Investigations concluded to an acute perforated appendicitis associated with necrotizing fasciitis of the anterior abdominal wall. After general supportive treatment and empiric antibiotherapy, the patient was operated on. Intra-surgical observations found a gangrenous perforated appendix with necrosis of the caecum and extended necrotizing fasciitis of the anterior abdominal wall. An ileocaecal resection with stomia and extensive debridement of the necrotic tissue along the fascial planes were performed. The patient died the next 12 hours due to septic shock with multiple organ failure.

1.2. Materiel and Methods: Medical Literature databases (PubMed and Google Scholar) were searched. Used Keywords were: necrotizing fasciitis, acute appendicitis, perforation, Fournier's gangrene. All cases of acute appendicitis with necrotizing fasciitis of the abdominal wall, retro peritoneum, thigh, and perineum were included. Cases of other intra-abdominal pathologies were not retained. We excluded necrotizing fasciitis seen postoperatively after appendectomy. The statistical analysis was made with SPSS (Statistical Package for The Social Science Version 21.0).

1.3. Results: Twenty-six cases of necrotizing fasciitis due to acute

appendicitis are reported in English literature. The sex ratio is 1,17. The mean age is 60,88 years (26-91). Morbidity was present in 15 cases (57,7%). Hypertension and diabetes mellitus are the most frequent comorbidity (respectively 53,3% and 46,7%). Psychiatric pathologies are noted in 4 cases (26,7%); obesity and cardiac pathologies in 3 cases (20%) both. The abdominal wall is the most involved site (56%). Other sites are respectively the retro peritoneum (40%); the thigh (28%) and the perineum (20%). The gluteal region and the thorax were noted in one case both. The mean time of evolution before surgery is 11,65 days (2-33). The appendix was perforated in 16 cases (69,6%), gangrenous in 5 cases (21,7%), inflammatory in 1 case (4,3%), and totally disintegrated in 1 case (4,3%). An extensive debridement was performed in all operated patients. An ileocaecal resection were performed in 3 cases (12,5%); a right colectomy in 2 cases (8,3%); a mid-thigh amputation or hip disarticulation in 3 cases (12,5%) and an orchidectomy in 2 cases (8,3%).

The global mortality is 38,5%. Mortality after surgery is 36%. The majority of the dead patient is elder than 50 (96,15%). Comorbidities are present in 71,43% of dead patients. The sex ratio in dead patients is 1,16. The delay before surgery is more than 6 days in 90% of dead patients.

1.4. Conclusion: Necrotizing fasciitis complicating acute appendicitis is an unusual complication of a common disease. Its diagnosis can be challenging. Early diagnosis aided with CT scan, empiric antibiotherapy, and large surgical debridement is the fundamental bases to lower the morbimortality of this affection.

2. Introduction

Acute appendicitis is a common abdominal emergency with a low mortality rate (0,27%) [1], however, delay in treatment increases the likelihood of complications such as perforation which increases up mortality. The evolution towards Necrotizing Fasciitis (NF) is a very rare but very serious problem. It tends to affect previously healthy young people in contrast to the typical patient at risk of NF [2].

Here in, we describe a new case of NF of the anterior abdominal wall complicating acute appendicitis and throw a review of English literature we studied epidemiological and clinical features of this entity.

3. Materiel and Methods

Medical Literature databases (PubMed and Google Scholar) were searched.

Used Keywords were: necrotizing fasciitis, acute appendicitis, perforation, Fournier's gangrene,

All cases of acute appendicitis with necrotizing fasciitis of the abdominal wall, retro peritoneum, thigh, and perineum were included.

Cases of other intra-abdominal pathologies were not retained. We excluded necrotizing fasciitis seen postoperatively after appendectomy.

The statistical analysis was made with SPSS (Statistical Package for the Social Science version 21.0).

4. Case Report

A 69-year-old man was admitted to our surgical department for abdominal pain with vomiting, constipation, and anorexia for the past two weeks. Because of measures of confinement in the era of the Covid19 pandemic the patient did not present to the emergency department. He had been taken oral analgesics and laxative which

does not alleviate his pain. His past medical history includes hypertension. On admission, he exhibited signs of dyspnea, tachycardia (heart rate = 130 bpm), and fever of 39°C. He had correct blood pressure. The physical findings revealed tenderness of the right iliac fossa, hypogastric quadrant, and left iliac fossa, with erythema, swelling, and crepitus. Blood tests evaluation showed an elevated white blood cell count of 22900/mm³ with 85,1% of neutrophil forms, an elevated C-reactive protein of 378,94 mg/L, acute renal failure (Creatinine: 190,59 µmol/L, Creatinine clearance: 32,5 mL/min, Urea: 1,14 g/L) and hyponatremia (Na: 129mmol/L). Abdominal CT-scan demonstrated gas and fluid collection extending from the subcutaneous layers of the anterior abdominal wall and a perforated appendix, without any marked intra-peritoneal pathology (Figures 1, 2, 3 & 4). The diagnosis of acute perforated appendicitis associated with necrotizing fasciitis of the anterior abdominal wall was considered. The patient was started empirically ant biotherapy with Cefotaxim (3g/day) and Metronidazole (1,5g/day), and general supportive treatment. He was then rapidly taken to the theater. A midline laparotomy was performed. Intra-surgical observations found a gangrenous perforated appendix with necrosis of the caecum and extended necrotizing fasciitis of the anterior abdominal wall (figure 5 & 6). No other intra-peritoneal pathology was marked. An ileocaecal resection with stoma and extensive debridement of the necrotic tissue along the fascial planes were performed. A corrugated rubber drain was kept in the abdominal wall, and an aspiratif drainage was kept in the right iliac fossa. Due to the resulting aponevrotic defect, only the skin and the subcutaneous layers were sutured. After surgery, the patient was transferred intubated to the intensive care unity and died the next 12 hours due to septic shock with multiple organ failure.

The microscopic examination of the specimen concluded to gangrenous appendicitis without any sign of malignancy.

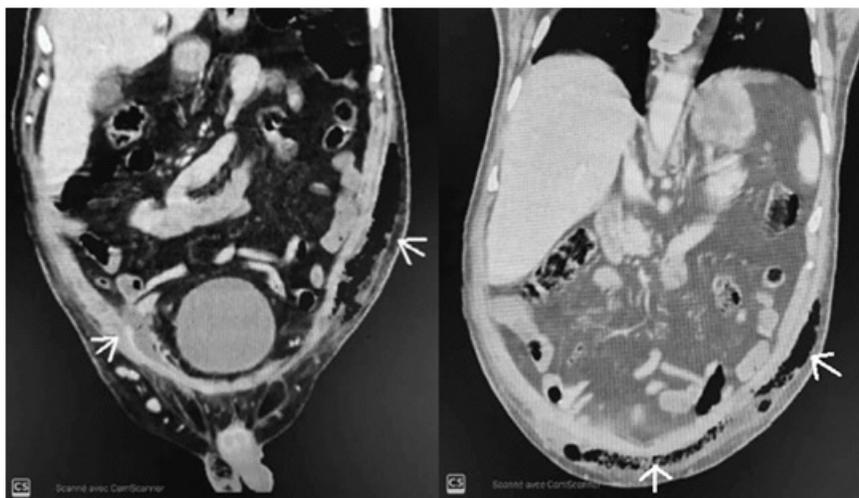


Figure 1&2: abdominal CT scann (coronal view) showing gaz and fluid (white arrows) from the subcutaneous layers of the anterior abdominal wall.

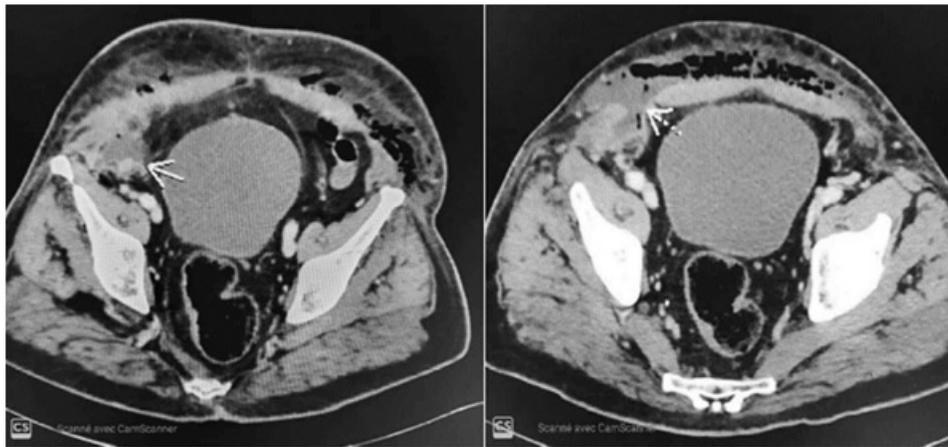


Figure 3&4: abdominal CT scann (axial view) demonstrating a perforated appendix (white arrow). Notably, the inflammation passed through the inferior epigastric vessels (discontinued arrow).

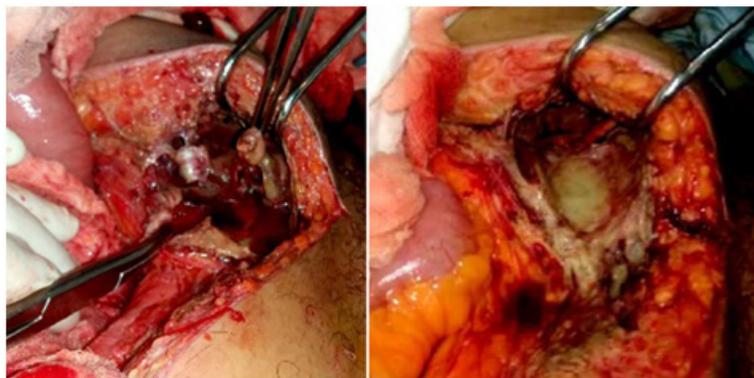


Figure 5&6: photograph showing necrotizing fasciitis of the anterior abdominal wall.

5. Results

Twenty-six cases of necrotizing fasciitis due to acute appendicitis are reported in English literature. The sex ratio is 1,17 (14 men versus 12 women). The mean age is 60,88 years (26-91). The mean age in men is 62,93 years and 58,5 years in women. Morbidity was present in 15 cases (57,7%), in 5 cases the past medical history was not mentioned. Hypertension and diabetes mellitus are the most frequent comorbidity (respectively 53,3% and 46,7%). Psychiatric pathologies are noted in 4 cases (26,7%); obesity and cardiac pathologies in 3 cases (20%) both. The other comorbidities are detailed in (Table 1).

The abdominal wall is the most involved site (56%). Other sites are respectively the retro peritoneum (40%); the thigh (28%) and the perineum (20%). The gluteal region and the thorax were noted in one case both.

The mean time of evolution before surgery is 11,65 days (2-33). One patient was not operated on. The appendix was perforated in 16 cases (69,6%), gangrenous in 5 cases (21,7%), inflammatory in 1 case (4,3%), and totally disintegrated in 1 case (4,3%). Appendix status was not mentioned in 2 cases (Table 2).

An extensive debridement was performed in all operated patients. An ileocaecal resection were performed in 3 cases (12,5%); a right colectomy in 2 cases (8,3%); a mid-thigh amputation or hip disarticulation in 3 cases (12,5%) and an orchidectomy in 2 cases (8,3%).

The global mortality is 38,5 %. Mortality after surgery is 36%. The majority of the dead patient is elder than 50 (96,15%). Comorbidities are present in 71,43% of dead patients. The sex ratio in dead patients is 1,16. The delay before surgery is more than 6 days in 90% of dead patients.

Table 1: chronic obstructive pulmonary disease ; * : adult-onset Still’s disease

Authors	Patient’s age	Gender	Medical history
MAZZA 1987 (14)	59	F	- none
GUIRGUIS 1989 (14)	80	F	- Atrial Fibrillation
JACOBS 1993 (14)	44	F	- unspecified
GERBER 1994 (15)	85	M	- Alzheimer
BOBROW 1996 (9)	63	M	- Depression
GROTH 1999 (2)	49	F	- Hypertension
HARMANT 2001 (14)	66	F	- unspecified
AWE 2003 (14)	28	F	- unspecified

MUKOYAMA 2003 (14)	77	M	- Depression
MARRON 2005 (12)	67	F	- unspecified
PENNINGA 2006 (10)	33	F	- Pregnant 35 week of amenorrhea
CHEN 2010 (6)	76	F	- Obesity - COPD* - Renal failure - Unspecified cardiopathy
MAI 2010 (16)	65	M	- Diabetes
TSIMOGIANNI 2012 (1)	52	M	- Unspecified
TAKEDA 2012 (14)	76	M	- Stroke - Diabetes - Hypertension - Cirrhosis - Stomach cancer - subarachnoid hemorrhage
TAIF 2014 (4)	26	F	- Unspecified
MARINIS 2015 (7)	83	F	- Diabetes - Obesity - COPD* - Renal failure
HUA 2015 (3)	50	M	- None
HUNG 2015 (17)	73	M	- Diabetes - Hypertension
	91	F	- Diabetes - Hypertension
WANIS 2016 (18)	28	M	- None
ROMANOFF 2016 (13)	71	M	- Hypertension - Gout
RAJAGURUR 2016 (19)	47	M	- Hypertension - Hyperthyroidism
HUANG 2018 (8)	65	M	- Latent tuberculosis - AOSD**
CHIN 2018 (5)	60	M	- None
ACTUAL CASE	69	M	- Hypertension

Table 2: S: survival / D: death

Authors	Delay for surgery (Days)	Body parts affected by fasciitis	Appendix condition	Associated lesions	Associated surgical procedure	Survival (S)/ Death (D)
MAZZA 1987 (14)	not mentionned	Abdominal wall + retro peritoneum	Perforated	None	None	D
GUIRGUIS 1989 (14)	not mentionned	Thigh	Gangrenous	None	None	S
JACOBS 1993 (14)	not mentionned	Abdominal wall	Perforated	None	Hip disarticulation	S
GERBER 1994 (15)	3	Perineum (Fournier's gangrene)	Perforated	None	Bilateral orchidectomy	S
BOBROW 1996 (9)	33	Abdominal wall	Perforated	None	None	D
GROTH 1999 (2)	21	Abdominal wall	Perforated	None	None	S
HARMANT 2001 (14)	9	Thigh + retro peritoneum	Not mentionned	None	None	D
AWE 2003 (14)	not mentionned	Lumbar region + retro peritoneum + gluteal region	Perforated	None	None	S
MUKOYAMA 2003 (14)	not mentionned	not mentionned	Gangrenous	None	None	S
MARRON 2005 (12)	not mentionned	Abdominal wall	Inflammatory	None	None	S
PENNINGA 2006 (10)	15	Thigh + Retroperitoneum	Perforated	Deep vein thrombosis	Ileo-cecal resection + Hip disarticulation	S
CHEN 2010 (6)	5	Abdominal wall + Retroperitoneum	Perforated	Cecal perforation	Right Hemicolectomy	S
MAI 2010 (16)	6	perineum (Fournier's gangrene)	Perforated	Cecal perforation	Ileo-cecal resection	S
TSIMOGIANNI 2012 (1)	not mentionned	Abdominal wall	Perforated	Cecal perforation	Right Hemicolectomy	S

TAKEDA 2012 (14)	not mentionned	Retroperitneum	Perforated	None	None	S
TAIF 2014 (4)	2	Thigh+ retroperitneum	Perforated	Not mentionned	Not mentionned	D
MARINIS 2015 (7)	28	Abdominal wall	Gangrenous	None	None	D
HUA 2015 (3)	10	Abdominal wall + retro peritoneum	Perforated	None	None	D
HUNG 2015 (17)	not mentionned	Abdominal wall + thigh + retro peritoneum	Perforated	None	None	S
	15 (No surgery)	Abdominal wall + retro peritoneum + Chest wall	No surgery	**	No surgery	D
WANIS 2016 (18)	10	perineum (Fournier's gangrene)	Destroyed	None	None	S
ROMANOFF 2016 (13)	7	Abdominal wall	Perforated	None	None	S
RAJAGURUR 2016 (19)	4	Perineum (Fournier's gangrene)	Perforated	None	Right orchidectomy	S
HUANG 2018 (8)	9	Thigh	Not mentionned	None	None	D
CHIN 2018 (5)	6	Abdominal wall + thigh + perineuFournier's gangrene)	Gangrenous	None	Thigh amputation	D
ACTUAL CASE	15	Abdominal wall	Gangrenous	Cecal necrosis	Ileo-cecal Resection	D

5. Discussion

Necrotizing fasciitis was described for the first time in 1952 as necrosis of the subcutaneous tissue and fascia with relative sparing of the underlying muscle [3]. It has an unfavorable outcome with an extension to the skin and muscle, and a rapid evolution towards septic shock and multi-organ failure [4].

This entity is more frequent in elderly and immunocompromised patients, however, even young healthy patients may be concerned [4].

The diagnosis is challenging due to its non-specific presentation, especially in front of a disproportion between a deep deterioration or systematic toxicity and local findings [4]. The skin changes such as discoloration, crepitus, blistering, fluid discharge, and bullae are often late and the diagnosis is usually confused with cellulitis [3].

The most frequent causes of NF are trauma, skin infections, drug injections, and surgical procedures [2,5,6].

Some cases of NF have been attributed to an intra-peritoneal process such as perforated colon carcinoma or complicated acute appendicitis [7]. The latest is extremely rare. To the best of our knowledge, only 26 cases have been reported in English literature (Tables 1 and 2). Its mortality is about 30-38% [8].

Its risk factors are close to the NF in general, such as elderly and comorbidity (especially diabetes and obesity). The delay in treatment of acute appendicitis increases the risk of NF and mortality [9]. Misdiagnosed appendicitis has been reported in 4 cases (15,38%) [1,9-11], and 90% of dead patients were sick for at least 6 days.

The evolution from acute appendicitis to NF of the abdominal wall or the thigh can be explained by the spread of the infection through a weak point between those spaces and the intra-abdominal space. Cases of Amyand and Garennot's hernias confortate this point of view [12,13]. For some authors, the importance of the inferior epi-

gastric point and the lumbar triangle of Jean-Louis-Petit in the potential propagation of the infection should be emphasized [3,8].

CT scan is the diagnosing modality of choice due to its rapidity and availability. It can reveal fascial thickening, gaze tracking, and focal fluid collections. It can also show the borders and any abdominal source of the inflammation. However, those findings are not always seen [1]. MRI may be carried out at the condition to not delay the surgical management [2,4].

Treatment consists of intravenous empiric antibiotics with general supportive measures and an aggressive debridement associated with the treatment of the origin of the infection [7]. For example, the two patients who underwent hip disarticulation survived [10,15], while the two patients who received conservative treatment died [3,8]. In two cases, a two-staged approach was performed with a favorable outcome [1,15].

6. Conclusion:

Necrotizing fasciitis complicating acute appendicitis is an unusual complication of a common disease. Its diagnosis can be challenging. Early diagnosis aided with CT scan, empiric antibiotherapy, and large surgical debridement is the fundamental bases to lower the morbimortality of this affection.

7. Main points:

- Acute appendicitis is a common disease which can lead to severe complications and death if not correctly treated.
- Necrotizing fasciitis is a rare but a severe complication of acute appendicitis.
- The evolution from acute appendicitis to necrotizing fasciitis may be explained by the propagation of the inflammation through weak points of the abdominal wall, with the influence of risk factors.
- CT scan is the diagnosing modality of choice.

- Aggressive debridement should be performed as soon as possible to improve outcomes

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