

COMMENTARY

The priority of Antonino D'Antona in describing rhabdomyolysis with acute kidney injury, following the Messina earthquake (December 28, 1908)

Natale Gaspare De Santo¹, Carmela Bisaccia² and Luca Salvatore De Santo³

¹*Dipartimento di Medicina, Seconda Università degli Studi di Napoli, Naples, Italy*

²*Istituto Mazzini di Napoli, Naples, Italy*

³*Dipartimento di Scienze Mediche e Chirurgiche, Università degli Studi di Foggia, Foggia, Italy*

Abstract

Following the Messina-Reggio Calabria earthquake (December 28, 1908) outstanding medical reports were published by Franz von Colmers (1875-1960), Antonino D'Antona (1842-1913), and Rocco Caminiti (1868-1940). The reports of D'Antona and Caminiti were heretofore neglected. Colmers, D'Antona and Caminiti described crush-syndrome. D'Antona who cured patients in shock also described two deaths due to uraemia. This gives him a priority in the description of crush syndrome with renal injury which has been traditionally attributed to Bywaters and Beall.

Key words

- renal injury
- crush syndrome
- Antonino D'Antona
- Rocco Caminiti
- Franz von Colmers

INTRODUCTION

Usually authors describing kidney injury following trauma start by quoting the earthquake of Messina, but the information, not supported by documents, is scanty and misleading [1, 2]. A typical example is provided by a recent authoritative review on rhabdomyolysis [3]. That review states that "in modern times the first cases of crush syndrome and acute renal failure (ARF) were reported during the Sicilian earthquake in Messina in 1908".

However, in modern English medical literature, the authors of the first detailed report of ARF related to the crush syndrome were Bywaters and Beall. They observed the conditions in four victims of the bombing of London during the Battle of Britain in 1940. These and many other reports on posttraumatic acute kidney injury (AKI) during the last hundred years always refer to a possible description after the Messina earthquake. However they all fail to substantiate the occurrence with documentation. Ultimately the precedence could be attributed to Bywaters [3, 4].

The aim of this paper is to review some unknown literature relating directly to the Messina earthquake and to demonstrate that the precedence in describing crush injury with shock and acute kidney injury was Antonino D'Antona (1865-1913).

THE MESSINA EARTHQUAKE

This disastrous event is also known as the Messina and Reggio earthquake. It occurred at 5.20', 27" a.m. on December 28, 1908. It lasted 37 seconds. Its magnitude peaked at 7.1 in the Richter Scale and grade XI on the Mercalli Scale (the maximum). It was followed by a tsunami (12 meter high waves). It caused 70 000 to 150 000 victims; the exact number was never established. Nearly 91% of the buildings in Messina and Reggio, including railway stations, were destroyed. First aid was given by personnel from Russian, British, French and American military ships.

SCIENTIFIC REPORTS ON THE EFFECTS OF THE EARTHQUAKE

Four main scientific reports dealt extensively with the survivors of the quake in Messina and Reggio Calabria [5-8]. Only the first is sufficiently known. From them one may extensively learn about (i) involvement of muscle mass, (ii) the effects prolonged compression, (iii) the compromised local circulation, (iv) shock, (v) debridement, (vi) fasciotomy and (vii) amputations.

REPORT OF FRANZ VON COLMERS

An outstanding report on wounded people was prepared by Franz von Colmers (1875-1960), a Jewish

traumatologist and military surgeon and a man with a rich personal history. He was the commander of the German Mission of the Red Cross (5 physicians, 12 sisters of the Red Cross, various collaborators) which reached Syracuse in Sicily on January 12, 1909 and remained there until February 28. Colmers, who had gained experience in 1905 during the Russian-Japanese War, took care of 83 patients with lesions related to the disaster in Syracuse *i.e.* not in the frontline of the earthquake. His detailed report, even on patients urine examinations, was discussed during the fourth session of the XXXVIII Congress of the German Society of Surgery on April 17, 1909. A comprehensive report, 47 pages long, was published [5]. It included four illustrations, three of which related to necrosis and gangrene following compression (*druockgangren*). Each single patient was described. There were details on 39 fractures in 34 patients, 25 operations on wounded persons, and 23 minor surgical procedures.

He did not describe kidney failure. The kidneys are mentioned however because of one patient requiring nephrectomy, a case of chronic pyelonephritis, a case of haematuria lasting 2 days in a young lady 31 days after the quake and a case of urinary incontinence due to a lesion of the medulla. No patient with shock was seen. It is important to note that von Colmers took no care of his patients until January 12 1909, that is 15 days after the earthquake.

REPORT OF ANTONINO D'ANTONA

On December 29 1908 Antonino D'Antona, at that time full professor of Surgery at the University of Naples, assembled, at the Surgical Clinic of the University, a team of 12 surgeons and 12 nurses to be moved by ship to Messina. This did not occur, however, since it was felt more appropriate to utilise the University Polyclinic in Naples to take care of the wounded who were arriving daily in hospital ships from Messina.

The first groups of patients arrived in Naples around 11.30 a.m. on December 30. D'Antona was nominated director of a special unit for assisting the survivors of the earthquake. All city hospitals (a total of 30) were put under his responsibility; all professors of the clinical sections of the university were ordered to collaborate with him. A total of 1862 patients were hospitalized [6, 7]. A total of 110 patients were shocked of whom 49 survived. There were 161 deaths overall, 61 due to shock (*Table 1*).

D'Antona took personal care of the most critical cases – a total of 192 patients. Around 1000 wounds were noted with a record of 17 crush injuries in a single patient. Seven patients had shock. He reported 19 deaths (7 had shock, 2 cases were uraemic, 5 cases developed tetanus and 5 died due to gangrene. Two shocked patients died with uraemia: Patient no.116 (D.A from Villa San Giovanni with multiple contusions) and Patient no. 120 (P.D. from Reggio) [6, 7].

The “pathogenetic event for all patients was a violent compression transient or lasting hours and days”.

Skin lesions presented “as black or pitch-black irregular spots with distinct borders which did neither protrude nor become hollow in relations to the intact skin,

in which they appeared as mounted. The contrast [between] healthy and diseased skin was clear cut. These necrotic spots were leather hard to the touch, hard but definitely compressible. Surgeon scissors revealed the kind of the lesions as well as their extension [...]. However there were also translucent yellow, or amber-yellow, spots always well delimited over the whole skin”. He also detected “mechanical necrosis as well as anemic necrosis with venous thrombosis” [6, 7]. “However the area of the spots were not indicative neither the extension nor of the depth of the lesions”.

Thus the crush syndrome is well described. The findings were personally illustrated by D'Antona at the Congress of the Italian Society of Surgery on October 31, 1909. Of the 192 patients under his direct care at the University Surgical Clinic seven were shocked and two of them died of uraemia.

The descriptions of the muscular lesions as well as bone fractures were very accurate. The crush syndrome (in Italian *sciacciamento*) was described accurately [6, 7].

REPORT OF ROCCO CAMINITI

Rocco Caminiti, (1868-1940), was deputy to D'Antona and Clinical Professor of Surgical Pathology, and Demonstrator and Surgeon of the Loreto Hospital in Naples. Being a native of Villa San Giovanni, on the day of the quake he was with the family because of the Christmas festivity. He was slightly wounded during the quake. He immediately organized, on December 28 1908, the rescue and treatment of people wounded [8]. He assembled a small team madeup of four sailors, a commissioner of police on vacation and a priest. He was a direct and vital witness of the effects of the earthquake. He personally assisted 224 wounded people among them 11 in shock, 80 with broken bones, 12 with visceral injuries and 7 with peripheral nerve lesions. He wrote “In those days the world seemed at the end”. “If we speak about medication my mind goes back to what we teach about procedures. However in those days it was not the case. Everyone tried to do the best allowed by the tragic circumstances”. His paper entitled *Report on wounded persons of the quake assisted in Calabria* was published in 1910 [8]. Here Caminiti described the survivors of the disaster, their cries, their psychosis, the necrotic muscle lesions and 80 patients with bone fractures. “Muscle lesions were the most

Table 1

The hospital net organized by Antonino D'Antona in Naples. Data from References [6] and [7].

Hospitals	30
Patients (hospitalized)	1862
Patients with shock	110
Deaths (n.)	161
Deaths (%)	8.6
Deaths in shocked patients	61
Deaths in shocked patients (%)	55.4
Death due to uraemia	2

severe and included wounds or bruised wounds, compressions due to wreckage, or beams lasting hours and days. Thus muscle mass was compressed, deprived of blood and therefore muscle tissue was the most compromised". The description of tissue necrosis is not different from that of D'Antona.

Caminiti also reported on the fractures of both clavicles in 4 persons (a rare occurrence), the prevalence of fractures of the humerus over those of the femur, and "lesions of the bladder, anuria due the lesion of the spine and of the spinal cord". He was very attracted by the variety of wounds and especially by lacerated and contused wounds, crushed wounds, those at that time described as "not clean" in the manuals of military surgery and "wounds originating below the point of compression, torpid and healing slowly".

DISCUSSION

The data demonstrate that rhabdomyolysis (as compression necrosis) was described following the earthquake of Messina by Franz von Colmers [5], Antonino D'Antona and by Rocco Caminiti [6-8]. D'Antona and Caminiti took care of patients with shock, Colmers did not because he assisted his first patient on January 12, that is 15 days after the disaster [5]. D'Antona also reported on two shocked patients who died because of uraemia [6, 7]. The historical precedence of the description of crush injury with kidney dysfunction should be attributed to D'Antona.

Bywaters and Beall in the *British Medical Journal* of March 1941 reported on 4 previously healthy people who had limbs crushed during the Battle of Britain and who presented with shock, swollen extremities, and dark urine and who progressed to renal failure. Bywa-

ters' syndrome became the eponym for crush injury with kidney dysfunction [4]. However the syndrome had been described decades before and the knowledge of this finally reached Bywaters who, in a personal letter of July 4 1941 to the *British Medical Journal* [9], recognised that the syndrome had been described in German literature [5] in 1909 by Colmers. This is also a wrong attribution as we have demonstrated in this manuscript.

Bywaters' mistake [4] is perpetuated by specialists involved in medical care after disasters [2, 10]. All reports have failed to recognize the primacy of D'Antona in describing crush syndrome with kidney injury. However in the *Dizionario Biografico degli Italiani* (*Biographical Dictionary of Italians*), 1986, Giuseppe Armocida, a renowned historian of medicine with international reputation, wrote: "His [D'Antona's] observations on persons injured by the earthquake of Messina and Reggio allowed him to characterise some specific lesions and to describe crush syndrome" [11]. However Armocida too did not mention the kidney injury. It should be stressed again that D'Antona [6, 7] and Caminiti [8] took care of patients with shock. Of 1862 persons hospitalized in Naples by D'Antona's net 110 were shocked, and 61 died (*Table 1*) out of the 192 persons under D'Antona's direct care seven were shocked. Six of them died, two with uraemia.

Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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