

Title:

“Pomegranate” spleen in disseminated tuberculosis

Authors: Alberto L. García-Basteiro^{1,2}, Mamudo R. Ismail³, Carla Carrilho³, Esperança Ussene³, Paola Castillo², Dércio Chitsungo³, Lucília Lovene³, Cesaltina Lorenzoni³, Miguel J. Martínez², Jaume Ordi², Clara Menéndez^{1,2} and Quique Bassat^{1,2*}

Affiliations:

1. Centro de Investigação em Saúde de Manhiça (CISM), Maputo, Mozambique (A.L. García-Basteiro, C. Menéndez, Q. Bassat)
2. ISGlobal, Barcelona Ctr. Int. Health Res. (CRESIB), Hospital Clínic - Universitat de Barcelona, Barcelona, Spain (A.L. García-Basteiro, P. Castillo, M.J. Martínez, J. Ordi, C. Menéndez, Q. Bassat)
3. Department of Pathology, Faculty of Medicine/Eduardo Mondlane University and Maputo Central Hospital, Maputo, Mozambique (M.R. Ismail, C. Carrilho, E. Ussene, D. Chitsungo, L. Lovene, C. Lorenzoni)

***Corresponding author**

Quique Bassat, MD, PhD

Email: quique.bassat@cresib.cat

Address: CP 1929 Maputo – Moçambique

Tel.: (+258) 21 81 01 81 Ext 326 Tel. /Fax: (+ 258) 21 81 00 02

Author contributions: ALGB and QB conceived the study. MRM, CC, ES, DC, LL, CL conducted the postmortem examination. MJM conducted the microbiological

analysis. PC and JO conducted the histopathological analysis. QB, PC took the pictures. JO, CM and QB supervised the study. ALGB and QB wrote the first version of the manuscript. All authors drafted the text and approved the final version as submitted to the journal.

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A 33 year-old HIV-infected female patient who had died at Maputo Central Hospital, Mozambique, after less than 24 hours of hospitalization, underwent a full post-mortem examination to ascertain the cause of death. Pre-mortem chest radiography showed hyperinflated lungs, with scattered bilateral lesions compatible with miliary tuberculosis, which was (after post-mortem examination) the final cause of death. The spleen was firm at touch, with multiple yellowish nodules randomly distributed through all the surface of the spleen capsule. Gross examination of the spleen sections showed that the nodules and plaques infiltrated massively the spleen parenchyma, which showed a characteristic **aspect of pomegranate** (figure 1a,1b). The histological sections confirmed the presence of caseous granulomas (Figure 1c). *Mycobacterium tuberculosis* bacilli in the spleen samples was confirmed by a specific in-house real-time PCR(1) and by Xpert® MTB/RIF assay. The main differential diagnosis of this rarely reported macroscopic finding would be splenic neoplasms, infarcts, abscesses and granulomas of varying aetiology, and in endemic areas, melioidosis(2). Although scarce data exist in the literature, the frequency of the underlying disease causing this macroscopic finding varies significantly depending on the geographical area. Infectious diseases account for a significant proportion of these lesions in developing countries(3), whereas in Western countries the predominant causes are neoplasms, mainly malignant lymphomas or metastatic carcinomas(4). Knowledge about the macroscopic aspect of splenic TB, resembling at cross section a pomegranate, could guide pathologists to grossly rule in disseminated TB diagnosis, especially in TB/HIV high burden countries.

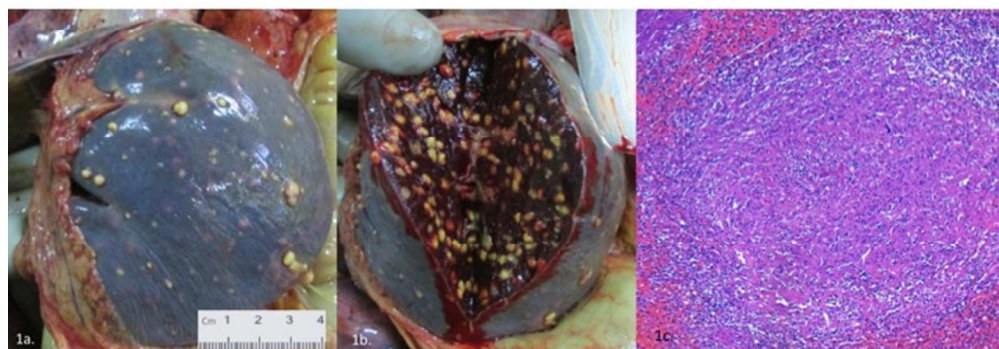
These images were taken as part of a large post-mortem study validating minimally invasive tools for post mortem investigation in sub-Saharan Africa and Brazil(5).

References

1. Espasa M, González-Martín J, Alcaide F, Aragón LM, Lonca J, Manterola JM, Salvadó M, Tudó G, Orús P, Coll P. Direct detection in clinical samples of multiple gene mutations causing resistance of *Mycobacterium tuberculosis* to isoniazid and rifampicin using fluorogenic probes. *J Antimicrob Chemother* 2005;55:860–5.
2. Gonzalez A, Certain L, Bhattacharyya RP. A 52-year-old Cuban immigrant with weight loss, dyspnea, and fever. Splenic tuberculosis. *Clin Infect Dis* 2011;52:368; discussion 418–20.
3. Joazlina ZY, Wastie ML, Ariffin N. Computed tomography of focal splenic lesions in patients presenting with fever. *Singapore Med J* 2006;47:37–41.
4. Kaza RK, Azar S, Al-Hawary MM, Francis IR. Primary and secondary neoplasms of the spleen. *Cancer Imaging* 2010;10:173–82.
5. Bassat Q, Ordi J, Vila J, Ismail MR, Carrilho C, Lacerda M, Munguambe K, Odhiambo F, Lell B, Sow S, Bhutta ZA, Rabinovich NR, Alonso PL, Menéndez C. Development of a post-mortem procedure to reduce the uncertainty regarding causes of death in developing countries. *Lancet Glob Heal* 2013;1:e125–e126.

Figure 1: Macroscopic aspect of the patient's spleen, as visualized during the complete diagnostic autopsy (1a.) and of the spleen's pulp, full of granuloma from mycobacterium tuberculosis origin confirmed by histological and microbiological analysis (1b.). Figure 1c. shows a histopathological section of one of those granuloma.

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Macroscopic aspect of the patient's spleen, as visualized during the complete diagnostic autopsy (1a.) and of the spleen's pulp, full of granuloma from mycobacterium tuberculosis origin confirmed by histological and microbiological analysis (1b.). Figure 1c. shows a histopathological section of one of those granuloma. 254x190mm (72 x 72 DPI)

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