Open Access Publish Free

http://jept.ir
doi 10.15171/jept.2018.07

Journal of Emergency Practice and Trauma
Volume 4, Issue 2, 2018, p. 67-72

Original Article

Abdominal trauma in a semi-urban tertiary health institution

Julius Gbenga Olaogun[1,2*], Olusoga Olusola Akute[1,2], Amarachuku Chiduziem Etonyeaku[2], Joshua Taye Ige[2], David Brown Ajibola[2], Jide Michael Afolayan[3], Eyitayo Ebenezer Emmanuel[4]

[1]Department of Surgery, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria
[2]Department of Surgery, Ekiti State University Teaching Hospital, Ado-Ekiti, Ekiti State, Nigeria
[3]Department of Anaesthesia, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria
[4]Department of Epidemiology and Community Health, Ekiti State University, Ado-Ekiti, Nigeria

Received: 18 March 2018
Accepted: 19 May 2018
Published online: 28 May 2018

***Corresponding author:** Julius Gbenga Olaogun,

Email: olaogunjulius@yahoo.com

Competing interests: None.

Funding information: None declared.

Citation: Olaogun JG, Akute OO, Etonyeaku AC, Ige JT, Ajibola DB, Afolayan JM, et al. Abdominal trauma in a semi-urban tertiary health institution. Journal of Emergency Practice and Trauma 2018; 4(2): 67-72. doi: 10.15171/jept.2018.07.

Abstract

Objective: There has been a global increase in the incidence of abdominal trauma in surgical patients. We conducted this study to evaluate the pattern of abdominal injuries, patient characteristics and the management outcome in our setting.

Methods: It was a descriptive (combined retrospective and prospective) study of all patients with abdominal trauma admitted and managed at Ekiti State University Teaching Hospital, Ado-Ekiti between January 2013 and December 2016. Data on socio-demographics, clinical profile, investigations, treatments and outcome were entered into a spread sheet and analyzed using SPSS version 20.0.

Results: A total of 2728 trauma patients presented during the study period. Of these, 68 (2.5%) suffered from abdominal injuries. Their ages ranged from 6 to 72 years (mean 30.3±13.2). Fifty-nine (86.8%) were males while 9 (13.2%) were females (M: F ratio = 6.6:1). Forty-nine (72.1%) sustained blunt trauma while 19 (27.9%) had penetrating injuries. Road traffic incident (RTI) (n=41; 60.3%) was the most common source of trauma, followed by assault: gunshot (n=9; 13.2%), and stab (n=7; 10.3%). Spleen (n=23; 33.8%) was the most common solid organ injured followed by the liver (n=7; 10.3%) while small bowel (n=8; 11.8%) was the most common hollow viscous injured. Forty-seven (69.1%) required operative intervention. Post-operative complication rate was 17% with wound infection (12.5%) predominating. The mortality rate was 4 (5.9%).

Conclusion: RTI and assault are major causes of abdominal injury. Measures to reduce RTI, youth restiveness and criminal activities will stem the tide.

Keywords: Abdominal trauma, Semi-urban tertiary institution, Treatment outcome

Introduction

Abdominal trauma has been described as a disease in evolution and a cause of considerable morbidity and mortality among trauma patients (1). About a third of trauma patients worldwide have abdominal trauma which accounts for a significant fraction of tragic loss of life (2). According to the World Health Organization (WHO), trauma will become the first or second leading cause of loss of productive years of life for both developed and developing countries by the year 2020 (3).

There is a rise in the incidence of abdominal injuries globally, and there are regional and worldwide variations in the aetiological factors associated with abdominal trauma (4,5). These factors include, but not limited to, civil and political violence, armed robbery attacks, increased automobile crashes, insurgency and global terrorism. Abdominal trauma may also arise from recreational activities like contact sports, and workplace and domestic incidents like fall from height. The health problems arising from automobile crashes remain unquantifiable especially in developing countries where those at the prime of productive life are often involved. In our sub-region, this becomes more pronounced amongst youths who use motorcycles for commercial transportation services without any formal training or certification (6).

Abdominal trauma is generally classified as either blunt or penetrating. Blunt injuries may result from vehicular crashes, warfare injuries, battering, fall from heights, sports accidents, martial arts, athletics and mountaineering while penetrating types are usually secondary to stab, arrow and spear, firearms and gunshot injuries (7).

The diagnosis of penetrating abdominal trauma is usually easy and reliable but blunt abdominal trauma is a real challenge even for experienced trauma and general surgeons as some injuries may not manifest during the initial assessment and treatment period. This is made

worse in a resource-constrained setting like ours where advanced diagnostic armamentaria such as focused assessment sonography for trauma (FAST), computed tomography (CT) scan and laparoscopy are not readily available in many centers.

There has been a paradigm shift from routine operative to selective non-operative management (SNOM) of both blunt and penetrating injuries over the years. The present maxim for penetrating injury is that "not everybody with a hole in the abdomen needs exploration" unlike before when routine laparotomies were required in all patients (8,9). We conducted this study in our setting to know the incidence of abdominal trauma, evaluate the pattern of abdominal injuries, patient characteristics and the management outcome.

Methods

This descriptive study was carried out at the Ekiti State University Teaching Hospital, Ado-Ekiti (EKSUTH). The hospital is a tertiary institution that serves as a referral center for the primary and secondary health facilities in Ekiti State and neighbouring States like Osun, Kwara, Ondo, Kogi, and Edo in southern Nigeria.

EKSUTH is a 350-bedded hospital which has 30 beds each in the male and female surgical wards and 10 beds in paediatric surgical ward. It has an accident and emergency department with an inbuilt emergency operating theatre, radiology department, pathology department and laboratory which consists of four units (microbiology, chemical pathology, morbid anatomy and haematology and blood transfusion services). There is a 4-suite operating theatre for day cases and other operations. In addition, there are dedicated theatres for ophthalmology and obstetrics and gynaecology departments.

This study evaluated all cases of abdominal trauma managed in our hospital between January 2013 and December 2016. The study comprises a retrospective arm (from January 2013 to September 2015) and a prospective period (from October 2015 to December 2016).

For the retrospective period, we reviewed the emergency room (ER) register and extracted the names and hospital numbers of patients managed for abdominal trauma. The list generated was used to retrieve patients' case notes from the medical records department. During the prospective period, all patients presenting at the ER with abdominal injury had relevant information entered into a data sheet designed for the study. The information sought were: patients' socio-demographics, presenting complaints, time of arrival at the ER, type and mechanism of injury, clinical examination findings, results of relevant radiological investigations (chest X-ray and abdominal ultrasound) and laboratory investigations. All patients had abdominal scan before leaving the emergency department for either ward admission or operating theatre.

Patients were adequately resuscitated and the decision to proceed to surgery or not was taken by the managing consultant based, among other things, on the patients' haemodynamic status, mechanism and extent of injury. The aggregate blood transfusion requirements of patients, and intra-operative finding (in those who had surgery) were recorded. Complications arising from patients' management were also noted. The outcome measures in this study were morbidity and mortality.

The data generated were entered into a spread sheet and analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0. (IBM incorporated).

Results

A total of 2728 trauma patients at the accident and emergency unit of EKSUTH were investigated during a 4-year period from 2013 to 2016. Out of these, 68 (2.5%) sustained abdominal injuries (43 (63.2%) patients were seen in the retrospective period while 25 (36.8%) patients were seen in the prospective period). Their ages ranged from 6 to 72 years (mean 30.3±13.2). Fifty-nine (86.8%) were males while 9 (13.2%) were females with male: female ratio of 6.6:1. The age distribution of the patients is shown in Figure 1. The most afflicted age group was 21-30 years followed by 31-40 years. There was a decline in the incidence of injuries from the fourth decade. The 2 patients above 70 years had domestic fall and sustained blunt liver and penetrating rectal injuries respectively.

Forty-nine patients (72.1%) had blunt trauma while 19 (27.9%) had penetrating injuries. The mechanisms of injuries are shown in Table 1. The majority of injuries (60.3%) resulted from road traffic incidents (RTIs). Injury sustained from hit by blunt object was the least (2.9%). Iatrogenic injuries from unsafe abortion practices accounted for 15.8% of the penetrating injuries.

The pattern of visceral injuries is depicted in Table 2. The spleen (33.8%) was the most common solid organ injured while the small bowel (11.8%) was the most injured hollow viscus affected in this study.

Other associated extra-abdominal injuries sustained by the patients are shown in Table 3. The chest (26.5%) was the most affected region of the body with varying degree of injuries. Five patients (10.2%) had multiple injuries.

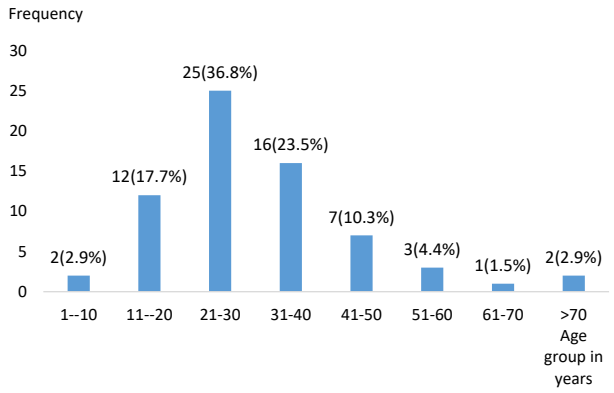

Figure 1. Age distribution of patients.

Table 1. Mechanisms of injuries

Aetiology	No.	Percent
RTI	41	60.3
Gunshot	9	13.2
Stab	7	10.3
Fall	6	8.8
Criminal abortion	3	4.4
Hit by blunt object	2	2.9

Table 2. Intraabdominal visceral injuries

Organs	No.	Percent
Solid organs		
Spleen	23	33.8
Liver	7	10.3
Pancreas	3	4.4
Kidney	2	2.9
Hollow viscera		
Stomach	1	1.5
Small bowel	8	11.8
Large bowel	4	5.9
Rectum	3	4.4
Urinary bladder	1	1.5
Other structures		
Mesentery	4	5.9
Greater omentum	1	1.5
Retroperitoneal haematoma	2	2.9
Multiple abdominal viscera	9	13.2

Table 3. Associated extraabdominal injuries with BAT

Associated injuries	No.	Percent
Thoracic*	13	26.5
Head	7	14.3
Extremities (long bones fractures)	5	10.2
Pelvic fracture	3	6.1
Spinal injury	1	2.0
Multiple	5	10.2

*Thoracic-punctured wound, rib fracture, haemothorax and pneumothorax.

Abbreviation: BAT, blunt abdominal injury

Patients had both non-operative and operative treatments as shown in Table 4. A total of 47 patients (69.1%) required surgical operations. More patients (32.7%) in the blunt group were managed non-operatively compared to the penetrating group (26.3%). The different surgical procedures performed on the patients are shown in Table 5. Splenectomy was the most commonly performed operation.

Eight patients (17%) developed post-operative complications with wound infection (12.5%)

Table 4. Mode of treatment

Treatment	No.	Percent
Blunt		
Non-operative	16	23.5
Operative	33	48.5
Penetrating		
Non-operative	5	7.4
Operative	14	20.6
Total	68	100

Table 5. Surgical procedures performed

Operative procedures	No.	Percent
Splenectomy	18	38.3
Hepatorrhaphy	4	8.5
Nephrectomy	1	2.1
Closure of bowel perforation	6	12.8
Bowel resection with primary anastomosis	5	10.6
Repair of rectal injury with diverting loop colostomy	3	6.4
Repair of urinary bladder tear	1	2.1
Laparotomy and drainage of haemoperitoneum only*	9	19.2

*Two of the patients had retroperitoneal haematoma.

predominating. The range of hospital stay was between 2 and 32 days (mean 11.4±6.0) and those patients with extra-abdominal injuries had more prolonged stay on admission. Four patients died giving a mortality rate of 5.9%. Patients were followed up for an average of 14 months and no delayed complication was recorded.

Discussion

There has been an increase in the incidence of abdominal trauma worldwide with significant morbidity and mortality rates (1,4,5,9). The incidence is likely to rise in our environment due to increasing rates of urbanization, associated civil and political unrest as well as an increase in crime rate including armed robbery and road traffic crashes. The younger age groups are the most vulnerable group as they are more adventurous and mobile. The most affected in our study were in the third and fourth decades (41, 60.3%) with the mean age of 30.3 years. This is in consonance with the findings reported by other authors worldwide (9-12). Those commonly affected are the physically and socially active population, as well as the economically productive workforce. Thus, this would lead to significant economic loss to the family, community and the nation at large. Males (86.8%) were affected more frequently in this study, and this conforms to observations from earlier studies (9-13). This male predominance may not be unconnected with more involvement in outdoor activities, crimes and act of violence.

Blunt abdominal trauma accounted for the majority

(72.1%) of the patients managed while penetrating abdominal trauma accounted for 27.9%. This is similar to the studies by other workers that reported more blunt injuries (11-13). However, it contrasts with some other reports which recorded more penetrating injuries (5,9,10,12). The predominance of blunt injuries may be attributable to the high rate of automobile and motorcycle crashes as many unemployed youths now resort to using motorcycle for commercial purpose.

Road traffic crashes accounted for the majority (n=41; 60.3%) of blunt trauma cases followed by fall from height (n=6; 8.8%). Similar findings were recorded in various national and international studies (10,11,13,14). Poor road infrastructure (damaged roads, lack of pedestrian walkways and road signs), bad driving habits, over-loading, non-compliance with standard safety measures and lack of proper regulatory control by road enforcement agents are responsible for increased rate of accidents. Gunshot (13.2%) was the commonest cause of penetrating abdominal trauma followed by stab injury (10.3%) from assault and they all occurred in males. The only penetrating injuries (n=3; 4.4%) observed in females in this study were those resulting from criminal abortion. Unsafe abortion is still a significant health problem in our settings. Most abortions are performed in secrecy by many unskilled and inexperienced medical workers and even quacks thereby resulting in intra-abdominal injuries (15).

In our study, spleen was the most common solid organ injured followed by the liver. Similar findings of splenic injury preponderance have been reported by other authors (10,11,13,16). The gastrointestinal tract (GI) was involved in 17 (25.1%) cases and of these, the small and large bowel were the more affected segments in penetrating abdominal trauma. The small bowel vulnerability to injures is as a result of the large surface area occupied in abdominal cavity and the fact that they are only protected by the anterior abdominal wall. Other parts of GI like the stomach, duodenum and pancreas are fairly well shielded by the skeleton or by their position in relation to other structures. Similarly, the urinary bladder when empty is shielded by the pelvic bone.

Patients with abdominal trauma may have other associated extra-abdominal injuries that may impact their management and the outcome of this management (11,12,17). In this study, we reported that 13 (26.5%) patients had associated thoracic injury. This is similar to other authors who also reported chest injury to be the commonest associated injury in their studies (11,18,19). This is due to its close proximity to the abdomen, and some solid organ injuries may be associated with rib fractures. Chalya et al, however, reported that head injury was the most common associated injury (20,21). The presence of associated injuries has been found to be significantly related to increased length of hospital stay and mortality (21). Our findings were similar to this as patients with associated extra-abdominal injuries had prolonged hospital stay and three of the four mortalities were multiply injured. Therefore, early recognition and prompt treatment of these injuries can reduce the morbidity and mortality.

In the management of the patients, non-operative and operative modalities were employed in both blunt and penetrating injuries. The selection criteria for SNOM were haemodynamic stability at admission (pulse rate <100 beats/min, systolic blood pressure > 90 mm Hg and good response to fluid resuscitation), absence of significant intraperitoneal collection or peritonitis. The operative rate in this study was 69.1% and is comparable with 76% reported by Maske and Deshmukh in India, 70% by Musau et al in Kenya and 75.6% by Dodiyi-Manuel et al in Nigeria who saw more penetrating injuries of 73.3% (11,12,22) . However, a lower rate of 58.6% was reported by Chalya and Mabula (21). More patients (73.7%) required laparotomy in the group with penetrating injuries than those with the blunt trauma (67.4%). Four patients with stab abdominal injury and one with gunshot wound to the right upper quadrant benefited from SNOM with satisfactory outcome. This further supports the growing trend in moving away from routine exploratory laparotomy to SNOM in both blunt and penetrating injuries encapsulated in the aphorism that "not everybody with a 'hole' in the abdomen needs exploration" (8,9).

Splenectomy (38.3%) was the commonest surgical procedure performed for splenic injury in this study. Although SNOM is advocated in the current trend of management for low grade and even some high grade splenic injuries, in our setting where there is shortage of manpower and appropriate facilities for proper monitoring of patients on SNOM, surgical option may be a wise option. CT, as the gold standard for detecting and grading solid organ injuries as well as assisting in determination of desirability of operative intervention, is not available in our center. This could probably be responsible for a high operative rate in our center. Different surgical operations ranging from simple closure, resection with primary anastomosis and repair with a diverting colostomy were performed for varying degree of bowel injuries mostly from penetrating trauma.

Two patients (4.2%) had negative laparotomy and the findings in them were that of non-expanding retroperitoneal haematoma in zones 2 and 3. The indication for surgery in them was haemoperitoneum with haemodynamic instability. There was also ultrasound diagnosis of haemoperitoneum and both of them required preoperative blood transfusions. Accurate ultrasound diagnosis might have averted laparotomy in these cases. This further gives credence to a major limitation of ultrasound scan as being operator dependent.

Postoperative complications were recorded in eight (17%) patients. Six (12.8%) patients developed superficial surgical site infections, 1 (2.1%) patient with hepatic injury developed disseminated intravascular coagulopathy and

1 (2.1%) had pelvic abscess. Surgical site infection has also been reported as the most common postoperative complication in studies elsewhere (13,18,22). Four mortalities (5.9%) were recorded and they were all from blunt trauma. One of them was an elderly with chronic liver disease while the rest sustained multiple injuries. There was no mortality in those with penetrating injuries perhaps because the majority of them had no extra-abdominal injuries. The presence of associated injuries is a factor for increased mortality (21). This mortality rate was comparable to what was reported by some authors (5,23). Higher mortalities between 10% and 17.9% were also reported in other studies (11,13,16,21). However, we are aware that the mortality rate would be a function of how complex the injuries were among other factors.

Conclusion

The incidence of abdominal trauma is increasing globally and it is a cause of considerable morbidity and mortality among trauma patients. In our setting, blunt abdominal trauma is mostly secondary to road traffic crashes while penetrating injuries were due to stab and gunshot and the pattern of injuries is not different from those reported in other studies. Various preventive measures to reduce RTA will lead to a reduction in the incidence of abdominal trauma. Concerted efforts should be made by government at all levels at providing gainful employment for the teeming unemployed youths in order to reduce their restiveness and criminal activities.

Limitations

This study has some limitations. In the retrospective arm of the study, we had problems in data collection and some of the cases were excluded for lack of adequate information coupled with poor record keeping. CT which is the imaging modality of choice in evaluation and grading of solid organ injuries was unavailable making accurate preoperative assessment of injuries difficult. This could have accounted for high operative rate and negative laparotomy in some of our patients as the majority of patients with haemoperitoneum were subjected to laparotomy.

Ethical issues

Ethical clearance was obtained from the EKSUTH ethics' committee before the commencement of the study (Ethics No. EKSUTH/A/67/2015/10/011).

Authors' contributions

JGO, OOA, and ACE conceived the study and were involved in the design and data collection. JTI, DBA, JMA and EEE were involved in the data collection, collation and statistical analysis. JGO, OOA and ACE made the final draft of the manuscript. All the authors read and approved the final manuscript.

References

1. Smith J, Caldwell E, D'Amours S, Jalaludin B, Sugrue M. Abdominal trauma: a disease in evolution. ANZ J Surg 2005; 75(9): 790-4. doi: 10.1111/j.1445-2197.2005.03524.x.
2. Hemmila MR, Wahl WL. Management of the Injured Patient. In: Doherty GM, ed. Current Surgical Diagnosis and Treatment. McGraw-Hill Medical; 2008. p. 227-8.
3. Mock CN, Jurkovich GJ, nii-Amon-Kotei D, Arreola-Risa C, Maier RV. Trauma mortality patterns in three nations at different economic levels: implications for global trauma system development. J Trauma 1998; 44(5): 804-12; discussion 12-4.
4. Etonyeaku AC, Ogundipe KO, Omotola CA, Ishola OJ, Olasehinde O, Obonna GC. Spectrum of Gunshot Injuries in Civilian Practice at a Tertiary Hospital in a Semi-rural Community in Nigeria. East Cent Afr J Surg 2014; 19(1): 83-9.
5. Olasehinde O, Adisa AO, Aderibigbe AS, Alatise OL, Etonyeaku AC, Adesunkanmi AR, et al. Pattern and outcome of traumatic gastro- intestinal injuries in ile-ife. Niger Postgrad Med J 2015; 22(1): 37-40.
6. Oluwadiya KS, Kolawole IK, Adegbehingbe OO, Olasinde AA, Agodirin O, Uwaezuoke SC. Motorcycle crash characteristics in Nigeria: implication for control. Accid Anal Prev 2009; 41(2): 294-8. doi: 10.1016/j.aap.2008.12.002.
7. Aldemir M, Tacyildiz I, Girgin S. Predicting factors for mortality in the penetrating abdominal trauma. Acta Chir Belg 2004; 104(4): 429-34.
8. Baker P. Penetrating Wounds of the Torso. J R Army Med Corps 2001; 147(1): 62-72. doi: 10.1136/jramc-147-01-06.
9. Asuquo ME, Bassey OO, Etiuma AU, Ugare G, Ngim O. A Prospective Study of Penetrating Abdominal Trauma at the University of Calabar Teaching Hospital, Calabar, Southern Nigeria. Eur J Trauma Emerg Surg 2009; 35(3): 277. doi: 10.1007/s00068-008-8089-6.
10. Edino ST. Pattern of abdominal injuries in Aminu Kano Teaching Hospital, Kano. Niger Postgrad Med J 2003; 10(1): 56-9.
11. Maske AN, Deshmukh SN. Traumatic abdominal injuries: our experience at rural tertiary care center. Int Surg J 2016; 3(2): 543-8. doi: 10.18203/2349-2902.isj20160982.
12. Musau P, Jani PG, Owillah FA. Pattern and outcome of abdominal injuries at Kenyatta National Hospital, Nairobi. East Afr Med J 2006; 83(1): 37-43.
13. Ayoade BA, Salami BA, Tade AO, Musa AA, Olawoye OA. Abdominal injuries in Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria: Pattern and Outcome. Niger J Orthop Trauma 2006; 5(2): 45-9.
14. Yusufu LM, Sabo SY, Odigie VI. Blunt abdominal trauma in Zaria, Nigeria. S Afr J Surg 2005; 43(2): 46-8.
15. Olaogun JG, Adeojo IP, Ige JT, Briggs PK, Ajayi OO. Bowel prolapse and strangulation following induced abortion: a case report and review of literature. Int J Health Sci Res 2016; 6(12): 364-7.
16. Dogo D, Yawe T, Hassan AW, Tahir B. Pattern of abdominal trauma in North Eastern Nigeria. Niger J

Surg Res 2000; 2(2): 48-51. doi: 10.4314/njsr.v2i2.12184.
17. Adejumo AA, Thairu Y, Egenti N. Profile of abdominal trauma in federal teaching hospital, Gombe, North-east, Nigeria: A cross sectional study. Int J Innov Med Health Sci 2015; 4: 41-5.
18. Ahmed I, Hashmi SK, Tanwir F, Ahmed S, Saad M. Hepatic trauma and associated injuries- experience in a tertiary care hospital. Pakistan Oral & Dental Journal 2014; 34(2): 242-4.
19. Saaiq M, Niaz ud D, Zubair M, Shah SA. Presentation and outcome of surgically managed liver trauma: experience at a tertiary care teaching hospital. J Pak Med Assoc 2013; 63(4): 436-9.
20. Chalya PL, Mabula JB, Giiti G, Chandika AB, Dass RM, McHembe MD, et al. Splenic injuries at Bugando Medical Centre in northwestern Tanzania: a tertiary hospital experience. BMC Res Notes 2012; 5: 59. doi: 10.1186/1756-0500-5-59.
21. Chalya PL, Mabula JB. Abdominal trauma experience over a two-year period at a tertiary hospital in north-western Tanzania: a prospective review of 396 cases. Tanzan J Health Res 2013; 15(4): 230-9.
22. Dodiyi-Manuel A, Jebbin NJ, Igwe PO. Abdominal injuries in university of port harcourt teaching hospital. Niger J Surg 2015; 21(1): 18-20. doi: 10.4103/1117-6806.153191.
23. Munns J, Richardson M, Hewett P. A review of intestinal injury from blunt abdominal trauma. Aust N Z J Surg 1995; 65(12): 857-60. doi: 10.1111/j.1445-2197.1995.tb00576.x.