Review

Gastrointestinal surgery and the acquired immune deficiency syndrome

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H I G H L I G H T S

- Atypical conditions may be encountered.
- The best predictor of perioperative morbidity and mortality is the general health status.
- Postponing elective operations to start antiretroviral medication should be encouraged.
- Surgical intervention should be considered in life threatening surgical correctable disease.
- The risk of exposure is reduced by the growing role of minimally invasive surgery.

A R T I C L E   I N F O

A B S T R A C T

Acquired immune-deficiency syndrome (AIDS) is becoming an increasing problem to the surgeon. The impact of HIV/AIDS on surgical practice include the undoubted risk to which the surgeon will expose him or herself, the atypical conditions that may be encountered and the outcome and long term benefit of the surgical treatment in view of disease progression. The two factors most associated with surgical outcome and poor wound healing were AIDS and poor performance status (ASA score). This article questions whether gastrointestinal surgical procedures can be safe and effective therapeutic measures in HIV/AIDS patients and if surgical outcome is worthy of the surgeon's ethical responsibility to treat. As HIV/AIDS patients are not a homogeneous group, with careful patient selection, emergency laparotomy for peritonitis confers worthwhile palliation. However, aggressive surgical intervention must be undertaken with caution and adequate peri-operative care is required. Symptomatic improvement of anorectal pathology may make delayed wound healing an acceptable complication. Alternatives to surgery can be contemplated for diagnosis, prophylaxis or palliation.

1. Introduction

Human immunodeficiency virus (HIV) is an RNA retrovirus that infects human T lymphocytes [1–4]. The suppressed cellular immunity manifesting as AIDS allows the development of malignancies (Kaposi's sarcoma, lymphoma) and opportunistic infections (*pneumocystis jiroveci* pneumonia, *cryptosporidium*, *cytomegalovirus* (CMV), *herpes simplex virus* (HSV), *disseminated tuberculosis* and *candida* 5–10years later [5,6]. HIV has been isolated from every body fluid including blood, urine, tears, saliva, semen and cervical secretions [7]. There is no cure but highly active anti-retroviral drugs (HAART) prolong survival in some patients [8–10].

The surgeon is perhaps more likely to see patients with complications of AIDS such as diarrhoea, wasting and dysphagia (from oesophageal candidiasis or gut lymphoma) at their primary presentation [1,11]. A prognosis in this group is clearly limited with the median survival being less than 2 years; only very rare patients survive 4 years or more despite HAART [1,4]. Surgical presentation in HIV/AIDS is with anorectal complaints (40%), request for venous access (20%), cutaneous manifestations (20%), abdominal pain, requests for biopsy and others (20%) [1]. Symptoms arise from several causes but the most likely within the context of HIV infection

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include kaposi's sarcoma, bacterial diarrhoea, cytomegalovirus (CMV) infection and lymphoma. The question of whether to do a laparotomy in AIDS patients is of major importance to general surgeons because of the undoubted risk to which the surgeon will expose himself or herself, the atypical conditions that may be encountered, and doubt on the outcome and long term benefit of the surgical treatment in view of disease progression. Fortunately, the risk of seroconversion is small following a needle-stick injury although it can be greater in areas of high prevalence [12,18,19].

2. The heterogeneity of HIV/AIDS patients

HIV/AIDS patients are not homogeneous. Those with HIV infection only (A1, B1, A2, B2) have a lower operative risk and are less contagious than those with AIDS (C1, C2, C3, A3, B3) [4,12]. HIV/AIDS patients presenting with surgical disease may be divided into two clinical categories: (a) life-threatening surgical correctable disease and, (b) surgical interventions intended for diagnosis, prophylaxis, or palliation. The consensus is that in the first instance surgical intervention is obligatory but in the second instance alternatives to surgery can be contemplated [1,4]. Pathology occurring in HIV/AIDS patients can also be classified into two groups: (a) diseases with a definitive association with HIV and (b) coincidental diseases seen in the general population especially as HIV/AIDS patients on HAART are living longer. Increasingly, newly discovered diseases associated with HIV including disintegrating perineum syndrome and diffuse infiltrative lymphocytosis syndrome (DILS) affecting the parotid gland have come to the forefront [4].

2.1. The CD4$^+$ T-lymphocyte count

In trying to assess the prognosis in patients who are asymptomatic or have only minor symptoms of HIV infection the most important single laboratory prognostic marker is the CD4 count [13,14]. The decision to undertake surgery is aided by staging patients according to their level of general immunity (CDC stages 1-IV). A CD4 level of greater than 500 indicates mild disease and implies that appropriate operative treatment should not be withheld. A CD4 level of less than 500 indicates advanced disease and exceedingly poor outcome [14]. If possible, postponing elective operations with the aim of starting the patient on antiretroviral medication should be encouraged: operating on a healthier patient with a lower viral load and higher CD4 count is advantageous for both patient and surgeon (Table 1) [4,9]. However, CD4 studies of the value of viral loads and CD4 counts (alone or in combination) in predicting operative morbidity and mortality did not produce conclusive results and these tests are not ideal for every day practical use [4]. The four factors that have been found to increase operative morbidity and mortality in HIV/AIDS patients are (a) a compromised physiological state-as in general surgery the best predictors of perioperative morbidity and mortality appear to be scores that measure general health such as ASA (American Society of Anaesthesiology) risk classes or the Korsakoff's performance scale; (b) physiologically demanding surgery; (c) emergency surgery as opposed to elective procedures and (d) operations in contaminated fields, such as anorectum or oral cavity [1–4]. Patients with early HIV infection have an operative risk almost equal to HIV-negative patients and can therefore be subjected to any major surgery that is required [1,4]. The pathophysiological consequences of advanced disease (e.g. immunosuppression, malnutrition, infections and neoplasms) could dictate the scaling down of the magnitude of surgery to an acceptable and safe level. When assessing the suitability of an HIV positive patient for surgery, it is obviously useful to be able to estimate how long they are likely to survive [13]. Certain factors do predict the length of survival once AIDS has occurred. These include age and sex. Young people survive longer than older patients and the average survival of women is only half as long as that for men [13]. Perhaps the most important prognosis for the survival of an AIDS patient is the presenting AIDS diagnosis. Thus, patients with Kaposi's sarcoma survive longer than those with pneumocystis pneumonia who do better than those with *mycobacterium avium intracellulare* (MAI) infection or *cytomegalovirus* infections (CMV). The reason for this is that Kaposi's sarcoma and the various opportunistic infections occur at different degree of immunosuppression [10].

3. Abdominal pain in HIV/AIDS

Abdominal pain is common and is caused by gastrointestinal malignancies and opportunistic infections. CMV is the commonest cause resulting in a wide range of conditions oesophagitis, acalculous cholecystitis, sclerosing cholangitis, small bowel perforation, toxic megacolon, colonic perforation and haemorrhage, and spontaneous rupture of the spleen [15]. Patients may also present to the surgeon with less severe abdominal pain that does not amount to an emergency. Infectious causes are particularly common and many cases are associated with cryptosporidial infection of the gut and a few with CMV, but there remain up to one-third of patients in whom no associated infections are uncovered [1–4]. AIDS related sclerosing cholangitis is associated with marked abnormal liver function tests (alkaline phosphatase of over 400 iu/l) and abdominal pain. Endoscopic retrograde cholangiopancreatography (ERCP) is the only reliable diagnostic test [1]. Gastrointestinal Kaposi's Sarcoma or lymphoma may present with unremitting haemorrhage, small bowel obstruction, intussusception, or perforation [1,3,16]. Cutaneous Kaposi's sarcoma is usually asymptomatic and inspite of widespread cutaneous involvement is rarely the cause of abdominal symptoms [17]. Lymphadenopathy from *myocobacterium avium interacellulare* or lymphoma can result in appendicitis or jaundice by obstructing the appendiceal ostium or porta hepatis, respectively. These patients are difficult to manage as it is often unclear whether they need an immediate laparotomy [3]. It is crucial to have close liason between AIDS physicians and AIDS surgeons to exclude pre-terminal cases and keep down negative laparotomies to acceptable rate [4,11]. Negative laparotomy is not too infrequent an event for a patient with undiagnosed abdominal pain. These factors have led to an increased indication for diagnostic laparoscopy. Care should be taken, however, during laparoscopy by insisting upon using disposable ports with a vestibular flange to prevent splash back, and by deflating the abdomen prior to port withdrawal because any aerosol emanating from the port entry wound will harbour HIV [1–4].

3.1. Emergency laparotomy problems in AIDS patients

Abdominal pain is common in patients with AIDS, but less than 1% of patients with AIDS will need an emergency laparotomy [1]. Some patients (and their families) refuse surgery in desperate situations (such as bowel perforation) as they want an end to the

Table 1
Centre for disease control- 1993 revised classification system for HIV infection [12].

	Asymptomatic primary infection or PGL	Symptomatic (not A or C) conditions	AIDS, i.e. indicator conditions present
1. >500 CD4 cells/ul	A1	B1	C1
2. 200–499 CD4 cells/ul	A2	B2	C2
3. <200 CD4 cells/ul	A3	B3	C3

suffering [4]. The commonest presentation requiring laparotomy are megacolon, small bowel obstruction and localized peritonitis. Clearly, this is a very different case mix from the acute abdomen that the general surgeon sees in the non-HIV population [15]. Again the commonest disease processes, CMV colitis, B-cell lymphoma, acute appendicitis and atypical mycobacterial infection are quite different from those in the non-HIV population HIV [1–4]. Appendicectomy and colectomy are the commonest abdominal operations in AIDS patients [1,4,15]. With careful patient selection, emergency laparotomy confers worthwhile palliation [1,3,4]. A platelet count is mandatory prior to any surgery since thrombocytopenia is common [1]. A short-coming of the surgical practice in resource-limited and endemic areas is that appendicectomy specimens are rarely sent for histological examination. Being an extra-nodal lymphoid organ it could be the only initial indication of a lymphoma or an underlying pathology [20]. CMV has also been isolated from appendix specimens raising the possibility that CMV may be causative or a co-factor [11,15,24,25].

3.2. Surgical outcome

Although generally, the operative mortality for emergency and elective surgery in AIDS patients is high (30% for a routine open cholecystectomy in one series), patients undergoing elective procedures have a better outcome than those who are operated on as an emergency [11]. General anaesthesia results in depression of cell-mediated immunity and AIDS progression [1]. The currently lowered operative mortality for emergency surgery on AIDS patients (11% in one series) may be due to the fact that these patients are dealt with at an earlier stage (e.g. operating before an impending colonic perforation) and, are sufficiently fit (good ASA score) to withstand major surgery even in the face of major intra-abdominal sepsis [4]. The adjuvant treatment with HAART has improved the general resistance to infection and the patients are nutritionally better [8,10]. Most patients can recover from a laparotomy, given full medical and surgical support. These patients are treated in the intensive care unit (ICU), if indicated, and fed parenterally if indicated. AIDS patients should therefore be treated actively at every level once a decision has been made to offer laparotomy [1,4,8–10]. The long-term benefits are determined by the disease process itself [4]. Later deaths, as expected, are caused by disease progression. Survival at 1 month, 3 months and 6 months was 89%, 64% and 48% respectively [1]. Surgery conferred least benefit in patients with MAI or lymphoma [1,21,22]. The results of emergency sub-total colectomy for toxic CMV colitis/megacolon are poor, with up to a 71% 30 day mortality [23,25]. In general, septic sequelae and death occur most frequently after anastomosis following colectomy rather than diversion. The fashioning of a stoma is therefore recommended in all but the least severely immunosuppressed patients [24]. However, the decision to raise a colostomy should not be undertaken lightly since they are rarely reversed [1]. High operative mortality (71%) occurred with drug addicts of the streets of New-York. This was associated with poor nutritional status, late diagnosis with for example colonic perforation and, probably not being on adjuvant HAART treatment [3].

One concern in taking care of these patients is how their disease affects wound healing [4,26]. The poor nutritional state contributes to impaired wound healing but, malnutrition must be severe to affect wound healing as a wound physiologically has priority to body nutrients [27]. Thus, patients who are HIV- positive without AIDS have no increased risk of wound problems, while those with AIDS are more likely to have delayed wound healing [28,29]. There is surprisingly little morbidity from laparotomy itself in terms of wound problems such as late wound dehiscence. However, symptomatic improvement of the underlying pathology may make delayed wound healing an acceptable complication in many instances [4,29].

4. Anorectal surgery in AIDS patients

Operations for anorectal pathology represent one of the most common indications for surgery in HIV- positive patients [1–4,30]. Anorectal pathology in HIV/AIDS infected patients has not been impacted by highly active anti-retroviral therapy [31]. Two-thirds of AIDS patients needing surgical treatment for anorectal disease such as symptomatic haemorrhoids, perianal sepsis were rendered symptom-free. So treatment is well worth doing as the survival is close to the survival of patients with AIDS who did not have anorectal disease [28,32]. Haemorrhoidectomy is indicated in patients who fail conservative treatments such as rubber band ligation, infrared coagulation or sclerotherapy [28,33]. The results of haemorrhoidectomy in HIV-positive patients have been conflicting, most likely because of difference in the severity of AIDS. Hewitt et al., found no difference in wound healing times in HIV- negative *vs.* HIV positive, HIV positive *vs.* HIV/AIDS, or $CD4^+ > 200$ vs $CD4^+ < 200$ [34]. However, Morandi et al., found 50% of patients with AIDS failed to heal 32 weeks after haemorrhoidectomy [35]. The two factors most associated with poor wound healing were AIDS and Karnofsky's performance score. However, symptomatic improvement of the underlying pathology may make delayed wound healing an acceptable complication in many instances [4,35,36]. Anal warts in AIDS patients tend to be aggressive, dysplastic and harder to eradicate [37]. As with other viral infections, it is impossible to eradicate the causative human papilloma virus (HPV) infection by surgical excision. For this reason surgical excision of condylomas is effectively performed more for relief of symptoms and cosmesis [38]. There is good evidence that severe dysplasia may progress to carcinoma in-situ and thence to squamous cell cancer. HPV subtyping and biopsy help to predict those lesions likely to develop into invasive carcinoma. HPV subtype 16 is often associated with severe dysplasia and the new HPV 16 vaccine prevents anal and cervical cancer [39]. Squamous carcinoma of the anal canal is about 33 times more common in homosexuals than in non-homosexuals [40]. The premalignant anal carcinoma in-situ lesion may be rapidly progressive in immunocompromised patients (transplant recipients and HIV patients). Even so, it is a rare condition perhaps because the rate of progression is slower than the natural history of the HIV disease and there is a need for caution when considering treatment [41]. Radiotherapy may be helpful for symptomatic cases otherwise the patient is kept under observation. It should be noted that squamous cell carcinoma may be mistaken for a small benign ulcer, Kaposi's sarcoma may resemble an ulcerated haemorrhoid and non-Hodgkin's lymphoma may resemble a perianal abscess [22,42,43]. Chemo-irradiation is the treatment of choice for most invasive anal (squamous cell) cancers. Salvage abdominoperineal resection (APR) can be useful if the CD4 count is > 200 [44]. Otherwise the perineal wound will not heal [26].

HIV-associated ulcers are most commonly associated with patients with clinical AIDS and lower CD4 counts but now less common since the introduction of HAART [40.] Biopsy identifies treatable aetiologies of these ulcers, including *HSV, CMV, Treponema pallidum, Mycobacterium, Cryptococcus, Haemophilus ducreyi, Chlamydia trachomatis* and cancer [28,45]. AIDS ulcers are differentiated by their location proximal to the dentate line and the present of a cavity contributes to stool and pus trapping which results in disabling pain unrelated to bowel movements. As ulcer healing is not common pain relief is effected by debridement, unroofing cavities and repeat intralesional steroid injection [46]. There may also be fissures produced by anal canal trauma resulting from

changes in bowel habit, colitis, proctitis or the trauma of ano-rectal intercourse. Diarrhoea encourages anal ulceration and stool cultures for *salmonella*, *shigella*, *campylobacter* and *cryptosporidium* with microscopy for *giardia*, ova,cysts and *amoebae* are mandatory [28]. Fissures can heal by abstinence from anorectal intercourse [36]. Sphincter preservation is of the utmost importance during all anal operations because male homosexuals have a tendency towards incontinence and the diarrhoea associated with opportunistic colonic infections is often severe [30]. Also the HIV virus has a predilection for the external anal sphincter and AIDS patients easily suffer from urge (active) incontinence [28,32]. Inappropriate anal instrumentation or 'fisting' injuries can result in the most horrendous sphincter injuries which usually require permanent faecal diversion. American proctologists see very massive and erosive ulcers, which actually erode their way through the anal canal as in disintegrated perineum syndrome. Setons are recommended for most fistulae [3].

5. Conclusions

HIV/AIDS patients should not be regarded as a homogeneous group. Patients with early HIV infection have a perioperative risk almost equal to HIV-negative patients. The best predictor of perioperative morbidity and mortality are scores that measure general health such as ASA risk classes. The risks to the patient must be weighed against the potential benefits of surgery. Postponing elective operations with the aim of starting the patient on antiretroviral medication should be encouraged. The consensus opinion is that in patients with life-threatening surgical correctable disease surgical intervention is obligatory with active treatment at every level. The small risk of exposure is made smaller still by the growing role of minimally invasive surgery which benefits both surgeon and patient.

Conflict of interests

None.

Ethical approval

The research did not involve patients directly Thus there was no need for ethical approval.

Consent

None required.

Authors contribution

EPW substantially contributed to the conception, design and literature search; **GE** reviewed the pathological aspects of the debate; **AC** contributed in the literature search, **DN** contributed in the public health and epidemiological issues.

Guarantor

The Guarantor for the work is Prof Ngowe Ngowe, the Dean of the Faculty of Health Sciences, University of Buea, Cameroon, W/Africa.

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