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A CRITICAL REVIEW ON HIV/AIDS AND WOUND CARE

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Abstract

Wound infections in AIDS patients increase discomfort, prolong hospital stay, render an additional burden upon an already debilitated patient and weaken the immune system further. Treatment must relate to the aetiology of the wound and take into account the patients underlying health problems. The treatment of wounds in HIV-AIDS patients is not different from the standard treatment. There are wound -related criteria for selecting the appropriate types of dressing. The best dressing for postoperative wound healing by secondary intention is unknown. Continuing wound evaluation and the appraisal of what dressing is useful for the type of wound and stage of healing is the basis of optimum wound care. Optimum wound care, emotional support; health education will enhance both the emotional and physical wellbeing of the HIV-AIDS patient.

Key words: Human immunodeficiency virus (HIV), Acquired immune deficiency syndrome (AIDS), wound infection, delayed wound healing, optimum wound care, dressing types, nutrition, and pain control

INTRODUCTION

Acquired immune deficiency syndrome (AIDS) is becoming an increasing problem to the general surgeon (1, 2, 3). It is caused by infection with the Human Immunodeficiency Virus (HIV) which is an RNA virus that infects predominantly human T lymphocytes. It is transmitted by contaminated body fluids and, after a variable latent period of up to 2 years, it produces diminished immunological function which is manifest as AIDS. The suppressed cellular immunity allows the development of malignancies (Kaposi's sarcoma and lymphoma) and opportunistic infections including *Pneumocystis carinii* pneumonia, cryptosporidium, cytomegalovirus (CMV), herpes simplex virus (HSV), varicella zoster virus (VZV) and fungi (candida) (4).

AIDS is a worldwide pandemic with the highest prevalence in sub-Saharan Africa. Since its discovery in 1981, AIDS has rivalled the worst epidemics in history. As of 2004 an estimated 25 million people have died, and 40 million are living with HIV. There are about 58000 HIV/AIDS patients in the UK. The incidence has apparently levelled in the USA and Western Europe and the mortality from these infections has decreased as highly active antiretroviral therapy (HAART) has become widely available (4, 5, 6, 7).

HIV-AIDS patients being immunosuppressed will suffer from wound healing impairment and an increased susceptibility to wound infection. It appears

that 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 (5, 6). Surgery should be offered to HIV- positive patients without AIDS based on standard indications just as for HIV negative patients, but AIDS patients with more advanced disease, low CD4 counts (< 100) or poor performance status are at an increased risk for poor wound healing (5).

Although surgical procedures can be safe and effective therapeutic modalities, the benefits of resolution of symptoms must be balanced against this risk. Aggressive surgical interventions must be undertaken with caution (7, 8). The consequences of wound infection in AIDS patients are grave. They increase discomfort, prolong hospital stay, render an additional burden upon an already debilitated patient and weaken the immune system further.

A trial into 'task-shifting' from doctors to nurses in the management of HIV- infected patients receiving antiretroviral therapy has proved a success (9). It also would seem to be true with their wound care, as wound care has always been the main domain in surgical nursing, facilitated by the closer nurse-patient relationship.

Wound care

Wound healing is a complex but highly integrated process that involves several cell types. The ultimate aims of tissue repair are rapid restoration of tissue

continuity and a rapid return to normal function (10). Wound healing has three phases; a lag phase of 2-3 days which is the acute inflammatory response to injury; an incremental phase which involves the progressive collagen synthesis by fibroblasts and gain in tensile strength; and a plateau (remodelling) phase in which excessive collagen is removed with decrease in fibroblasts and inflammatory cells (11). The first 7-10 days is usually sufficient to allow removal of skin sutures without wound disruption (10).

Factors that adversely affect healing need to be common knowledge to surgeons so that where possible they can be eliminated to enhance patient recovery and the cost-effectiveness of care. The characteristics required of a wound for rapid and sound healing are ; no (or minimal) foreign material, no infection, accurate apposition, no excess tension, good blood supply and no haematoma separating edges (12). In a heavily contaminated or infected wound it may be appropriate to use delayed primary closure or allow healing to proceed by second intention (13).

The World Health Organization suggestions for reduction of wound infection (14, 15) are as follows : 1) short preoperative stay to prevent acquisition of hospital acquired infection, 2) antiseptic shower before operation, 3) shaving kept to a minimum, 4) avoid wound contamination, 5) meticulous attention to surgical technique, and 6) as speedy an operation as it is safe. Wound care for HIV-AIDS patients should incorporate these suggestions although recent trials have shown no clinical benefit of antiseptic showering before operation in normal patients (16, 17).

Sources of infection in HIV-AIDS patients

The sources of infection are a) endogenous and b) exogenous (18). Endogenous infections arise from the patient's normal bacterial flora which contaminate the wound and cause infection. Prevention is by scrupulous patient hygiene, using clean bed linen and clothing, and avoiding wound contamination by poor dressing technique (15, 19). Exogenous infections arises from cross infection through hospital staff (hands), other patients, equipment and the environment (e.g. dust on curtain rails, bed frames).¹Prevention is by washing hands using liquid soap and drying carefully after every patient contact. It is advisable to use a bactericidal agent prior to aseptic procedures including wound dressing. An alternative is alcoholic hand rub especially at the bedside. Infection control also includes the use of sterile gloves, forceps and hand washing after removal of gloves (14, 20). The principles of wound care in AIDS patients are little different from the standard treatments (1, 2, 6, 7).

Principles of wound care:

1. *Aseptic technique* ; the use of sterilised instruments with disinfected hands in sterilised gloves working on an antiseptically disinfected wound and surrounding skin covered with sterilised drapes. Antiseptically prepared skin eliminates exogenous skin organisms

which are an important source of post operative wound infection (21).

2. *The type of wound* will determine the approach. Is it surgical or non-surgical? If surgical, is it a clean wound? e.g. hernia repair; clean-contaminated? e.g. cholecystectomy; contaminated wound? e.g. colonic resection, or a dirty wound? e.g. peritonitis secondary to intestinal/abscess perforation. Is the wound superficial or deep? Non-surgical wounds may be traumatic laceration, degloving, pretibial injuries or burn injuries. All non-surgical wounds should be regarded as potentially contaminated (22, 23).

3. *The choice of dressing* depends on individual wound evaluation. Is it necrotic, sloughy, infected, and granulating or epithelializing? Is it flat or a cavity? Ideally the wound should be kept warm and moist, protected from infection and physical damage. Excessive moisture in the wound bed may soften and weaken the wound edges (maceration). As a result the wound may enlarge and pathogenic organisms will be able to penetrate the surrounding skin and cause infection (24). Exudates and dead tissue should be removed following copious saline irrigation especially of dirty wounds.

4. *Continuing evaluation* of the wound is essential to detect early tissue degeneration which will suggest a change in dressing, cleanser or debrider. Evaluating the old dressing is helpful (25,26). Good blood supply to the wound may be promoted by refreshing the wound and healthy tissue maintained in and around the wound.

5. *Wound sutures* should be given careful consideration. As wound healing may be delayed, each individual suture line must be evaluated to establish if healing is complete (10). The timing of suture removal should not depend on dogma. It should follow the evaluation of the individual's wound as there are various factors, especially the site and the patient's general health including immune status which may delay healing. The loose sutures used to close the upper or lower eyelid wounds are often removed at 48 h. Elsewhere on the face, sutures are removed at between 4 and 5 days all because of their excellent blood supply. Where movement increases the risk of dehiscence, in hand and limb wounds for example, it is common to leave in sutures for 10 days. Sutures left in longer than necessary may encourage infection, and will leave unnecessary marks or keloids especially on negroid skin.

6. *Wound drainage*: closed suction drainage minimises the risk of wound infection. The drain should be removed as soon as the fluid ceases (17, 18).

Wound assessment

This has had a tendency to be broad, subjective, inadequate and providing inaccurate information. The practitioner should appreciate the stage of healing, the type of tissue and expectation of time to complete healing. The choice of dressing is commonly based on the type of tissue present or as a colour scheme, e.g. black, yellow, red, and pink. There are dangers with this type of classification, as 'black' tissue is usually necrotic, but it could also be

gangrene, which would affect the treatment chosen. Also 'yellow' could be slough but also fat, tendon or bone. Sloughy wounds comprise a complex mixture of fibrin, protein, serous exudate, leucocytes and bacteria. Granulating wounds comprise of collagen and proteoglycans which produce a gel-like matrix. Epithelializing wounds consist of soft and fragile tissue and can be easily damaged by inappropriate dressing choice. Without such knowledge dressing selection is likely to be arbitrary, and potentially ineffective and wasteful of both time and resources (25,26). Continuing wound evaluation and the appraisal of what dressing is useful for the type of wound and stage of healing is the basis of optimum wound care (26). The difficult task facing the practitioner is to identify the most appropriate dressing for each stage of the healing process as no single wound dressing will be able to deal with all wound situations. There are, however, wound-related criteria for selecting the appropriate types of dressing.

Thomas and Leigh (25) described the optimum healing environment for the wound, which should be: moist with exudates but not macerated; free of clinical infection and excessive slough; free of toxic chemicals, particles or fibres released by the dressing; at the optimum temperature; undisturbed by frequent or unnecessary dressing changes and at the correct pH. Research in this area continues in attempting to identify how this optimum environment can be achieved (24, 26). There are several reasons for using a dressing: 1) to **protect** from drying, infection, further damage, 2) to debride- mechanically, chemically and to promote autolysis (27). 3) to **control-** bleeding, exudate, pain, odour, 4) to **maximize compliance-** patient, nurse, doctor system. The patient should be able to continue with her normal daily routine and the dressing regime should reflect this. 5) to **stimulate healing** – pharmacologically, physically (12, 28, 29). Dressings need to be changed less often for a clean wound but there is no substitute for frequent dressing changes in a grossly contaminated or recently debrided infected wound. Wounds should be kept moist (but not wet) at all times for normal cellular physiology. Desiccated tissue is dead tissue and must be sharply debrided.

Factors that are important in promoting healing include debridement, promotion of granulation and promotion of epithelialization. These factors can then be compared with the properties of the various dressings' materials available. If a number of dressings satisfy the wound's needs, the final choice is made by considering relative efficacy, cost, convenience and patient acceptability. There are a number of factors which influence the process of selecting the most appropriate dressing. These include the **individual** patient, the **wound**, and the type of dressing.

Dressing types

Modern wound management offer a whole host of materials and dressings that provides a variety of benefits in the process of wound healing (30). A range of modern dressings might consist of contact

materials: gauze (not as first option, if at all), low! non –adherent dressings; semi- permeable films; hydrogels; hydrocolloids; alginates; foams; antimicrobials plus growth factors. The best dressing for postoperative wounds healing by secondary intention is unknown because of the small, poor quality trials existing which render the evidence for best dressing insufficient (30). Foam is best studied as an alternative to gauze and appears to be preferable in terms of pain reduction, patient satisfaction and nursing time (31, 32). The traditional dressings include gauze and 'Gamgee', which are cheap but which have a tendency to stick to wounds causing trauma and pain on removal. Low adherent and non-adherent dressings provide a surface which is less traumatic to remove. Tulle dressings, if used correctly can be of low adherence. They are also cheap but their use is limited on wounds with high or viscous exudates.

Semi permeable film dressings are made from a clear polyurethane film coated with an adhesive. They conform well, are resistant to shearing and tearing, and permit constant observation. They provide and maintain an environment conducive to healing. Such dressings are not suitable in the case of heavily exuding wounds (33, 34, 35). The main advantages of using a semi permeable film are: acts as a bacterial barrier, elastic and durable, permeable to water and gases. The main disadvantages are: tends to collect fluid, which can cause maceration, some are difficult to apply correctly, can only be use for a flat surface, and skin reactions can be caused by adhesive. Examples are Bioclusive, Cutifilm, Epiview Opsite Flexigrid, Tegaderm.

Hydrocolloids *e.g. granuflex* consist of a mixture of carboxymethylcellulose, pectins, gelatins and elastomers. They are available in pastes, granules and wafers. On contact with wound secretions, the hydrocolloid material forms a gel, providing the optimum conditions for moist wound healing (34). Patients and users should be warned that the gel becomes pus-like in appearance and they should expect to detect an odour. The correct size of dressing may be left in place for 5-7 days. The main advantages of using hydrocolloid dressings are: easy to use, durable, positive effect on healing and cost-effective. The main disadvantages are: they can cause an odour, sometimes difficult to remove, cannot be used for cavities and may cause over- granulation.

Hydrofibre consists of sodium carboxymethylcellulose spun into a fibre. It is highly absorbent and retains exudates. The fibres 'gel' into a sheet. The dressing is indicated for moderate to highly exuding wounds. It can be used for infected wounds, as long as it's changed daily. The main advantages are: they are comfortable, do not cause maceration of surrounding skin highly absorbent and can be used on sloughy wounds (33, 24). Its main disadvantages are: some forms are costly and appearance may be confused with alginate dressings *e.g. aquacel*.

Hydrogels *e.g. Intrasite gel* consist of insoluble polymers, water and propylene glycol. They interact with fluid and absorb and retain large volumes of exudates (36). These dressings are available in different forms- sheets or gels. They are effective debriding/ desloughing agents and may be applied throughout the healing cycle (27). A hydrogel dressing is used on necrotic tissue because it facilitates autolytic debridement of rehydrating dead tissue and promotes phagocytic and enzymatic activity. Their use in the acute surgical cavity wound is not yet reported and maceration can occur in wounds that are heavily exuding. Their main advantages are: comfort, absorbent and debriding properties and as potential carriers for other treatments. Their main disadvantages include the requirement for frequent changing, can cause maceration of surrounding tissue, some forms are costly, and difficulty to retain on wound because of relative liquidity.

Alginate dressings *e.g. Sorbsan, Kaltostat* occur naturally as mixed salts of alginic acid and are found in and extracted from certain species of seaweed. When used on moderately or heavily exuding wounds, alginates will absorb secretions to form a gel, and this gel provides the optimum humidity and temperature conditions for moist wound healing (34). They are available in sheet form, packing/ribbon and

as extra-absorbent sheets. Gentle irrigation with normal saline is effective in removing the dressing. Their main advantages are: varying absorbencies, forms a gel which is easily removed, can be used to pack sinuses and some have haemostatic properties. The main disadvantages are not to be used on dry wounds; sometimes require a quantity of saline to remove and require frequent changing if wet.

Foam dressings consist of polyurethane or silicone foam. They are absorbent (negative pressure wound dressings) and retain a moist environment (31). They are suitable for a wide range of granulating wounds, both flat and cavity. Wound healing for even chronic wounds can be greatly increased (30). Great care should be used; apply negative pressure wound dressing only when indicated. They are currently two types of cavity foam dressings: 1) liquid foam polymer- comes in two parts, a base and a catalyst, which are mixed directly to form a setting mixture. This sets to form a soft, spongy stent of the cavity. 2) Hydrocellular cavity wound dressing is available in a range of preformed sizes. Advantages of using foam dressings are: thermal insulation, protection (prevents 'strike through' of exudate to wound surface), permeable to water/gases, easily shaped and varying degrees of absorbency. The disadvantages are; costly and not always available. Examples are Allevyn, Flexipore, Lyofoam, Spysorb and Cavicare.



Figure 1: Foam (Allevyn) dressing of a granulating laparotomy wound

Antimicrobials:

Aseptic techniques help decrease the risk of infection as does the use of antibiotics in wounds that are contaminated (21). The use of topical agents has been challenged in the last decade, which has led to a decline in their usage. Antiseptics can be toxic when used on open wounds and disinfectants including hypochlorite solution such as Dakin's solution, Edinburgh universal solution (Eusol) are also toxic to healing tissues but have anecdotally found a role in debridement and in wound bed preparation prior to skin grafting. However, given the problems surrounding the overuse of systemic antibiotics (rise in resistant organisms notably MRSA and emergent infections such as *Clostridium difficile*), many clinicians are now reviewing the clinical and experimental evidence against antiseptics with renewed enthusiasm (37). All wounds, regardless of type, may become colonised by microorganisms. However, the presence of bacteria does not necessarily indicate infection. It is the species of bacteria present or the rapid increase in a number of pathogenic bacteria past a certain critical level that leads to a clinical infection

which is detrimental to wound healing.⁸ Clinical infection may necessitate treatment with systemic antibiotics and/or the use of a medicated dressing. These dressings include medicated tulle, iodine

(Inadine) and silver- based products (13). In neutropenic HIV/AIDS patients with disseminated candidiasis, wound swabs of chronic (delayed-healing) wounds will grow fungi that would respond to systemic antifungal medication (38,40).

HIV infected patients are at high risk for community-acquired MRSA. Monitoring the results of antimicrobial sensitivity profiles in their patient population will allow the clinician to base the empiric antimicrobial therapy upon local resistance patterns. Incision and drainage of a cutaneous abscess may be required and the wound should be cared for using standard wound care techniques. Subsequent follow-up is necessary to care for the healing wound and to assure that the empirical antimicrobial agent being utilized is likely to be effective based upon the

antimicrobial sensitivity profile obtained from the wound culture (41).

The following factors should be considered before prescribing an antimicrobial product: local or systemic infection; likely infective organism; increasing problems of resistance with overuse of antibiotics and antimicrobials; sensitivities of the patient to products and length of proposed treatment (37,39,40). Examples are Sofra-tulle, Fucidin Intertulle, Bactigras, Serotulle, Clorhexitulle (contains chlorhexidine acetate 0.5 %)- used extensively in burns management. Inadine- similar in appearance to other tulle products contains povidone iodine in polyethylene glycol base on a knitted viscose fabric. Silver sulphadiazine (Flamazine)- has a broad spectrum antibacterial effect, particularly against *Pseudomonas aeruginosa*, and is also effective against fungi (37,40).

Recent innovations

Growth factors

Developments in molecular biology have elucidated 30 biological mediators that are known to have an effect on wound healing. They play an important role in the normal wound healing process and have the potential to be used as a topical treatment for wounds to promote healing. In normal intact skin there is biochemical evidence of continual cytokine activity with a balance between inhibitory and stimulatory factors to provide a stable epidermis. In the presence of tissue injury, as with an acute wound, the growth factor activity increase. The following issues should be considered in relation to the use of growth factors: the growth factor administered must be appropriate to the stage of healing; the wound should actually be deficient in the growth factor being applied; the growth factor should be delivered in sufficient amount and duration to produce the desired response. Examples are epidermal growth factor (EGF), transforming growth factor (alpha TGF alpha and β TGF β); platelet derived growth factor (PDGF), fibroblast growth factor (FGF); and tumour necrosis factor (TNF). The disadvantages of using growth factors are: cost of treatment, treatment may not be available and the application method. It may need to be injected into the wound, and the choice of which growth factor, when, and what dosage is a problem (42). Growth factors are obviously not an alternative to good wound care.

Artificial and living skin equivalents

Topical antimicrobials decrease the rate of colonisation of a wound, but do not prevent microbial invasion and proliferation. Therefore it is essential to close large wounds especially burn wounds by skin grafting after early wound excision and removal of toxic nonviable tissue. Depending on its composition, tissue- engineered skin can facilitate cell proliferation, production of extracellular matrix components and increase local concentrations of growth factors in the wound. Skin substitutes include epidermal components, e.g. Vivoderm, dermal components, e.g. Dermograft, and composite grafts. i.e. those

containing epidermal and dermal components, e.g. Apligraf. No synthetic dermal replacement has been found to equal allograft dermis in closing wounds (43, 44).

Nutrition

Adequate nutrition aids the ability to cope with surgery and decreases the risk of post operative infection.. It *assists* recovery (the body's response to trauma), promote wound healing, immune function and avoids complications like deep vein thrombosis and pressure sores (45, 46). The assessment of nutritional status preoperatively identifies those at risk. Wound has high priority when competing with unwounded tissue for body resources. Therefore malnutrition has to be very severe before healing is affected. Wound dehiscence and infection are common when the serum albumin is low. When recent weight loss is greater than 20% of original weight healing problems can be anticipated (47). Protein meal and vitamin C (ascorbic acid) should be encouraged. The protein, collagen is the basic framework of a healed wound. It is synthesised within the endoplasmic reticulum of the fibroblasts and leaves the cell as tropocollagen. Proline and lysine are essential for collagen formation and oxygen and ascorbic acid (vitamin C) are necessary for proline hydroxylation and incorporation into tropocollagen. Tropocollagen polymerises between cells to form cross banded collagen fibrils (46, 48). Zinc is a component of enzymes involved in the healing process. Its deficiency retards healing. Supplements of ascorbic acid and zinc are effective when these factors are deficient but do not improve healing in normal subjects. Some patients may need nasogastric enteral feeding if the gut is functional.

If insufficient; nutrients should be given as total parenteral nutrition (TPN) (48, 49). Over the past decade there has been increasing interest in the use of specially formulated feeds, both enteral and parenteral, to modulate the immune response to injury and illness. Although no study has specifically examined the role of these feeds in HIV/AIDS patients, there is increasing evidence that they may be beneficial in the management of malnourished surgical and critically unwell patients (48, 50). Glutamine *is* considered to be a 'conditionally essential amino acid; although it is synthesised in most tissues, plasma concentrations become depleted when consumption is increased, such as in metabolic stress and infection. Glutamine acts as both a nitrogen and energy source for lymphocytes and small intestinal mucosa, and reduced concentrations are associated with immune dysfunction and poor outcomes (51).

Patient comfort

Pain control is essential in reducing complications postoperatively. Pain causes a rise in cortisone via the hypothalamo-pituitary axis. Cortisone causes gluconeogenesis and this delays wound healing as protein is depleted. Increased cortisone also dampens immune function. Strong analgesics (e.g. opiates)

however should be avoided as they can depress respiration and predispose chest infection. For painful short procedures for example wound dressing and physiotherapy entenox (nitrous oxide gas) may be given (3, 52).

Summary

The treatment of wounds in HIV-AIDS patients is not different from the standard treatments. The treatment must relate to the aetiology of the wound and take into account the patient's underlying health problems (including medical history, medication, nutritional status, lifestyle e.g. tobacco and alcohol habits, psychological problems and quality of life). Prior to selecting the best dressing the characteristics of the wound bed such as necrotic tissue, granulation tissue, infection; the condition of the surrounding skin (normal, oedematous, white, shiny, warm, red, dry, scaling, thin) and the clinical signs of critical colonisation or local infection : delayed healing, odour, abnormal granulation tissue, increased wound pain and excessive exudate , are evaluated. There are wound- related criteria for selecting the appropriate types of dressing. An ideal dressing should maintain a moist environment for healing, enable trauma-free removal, facilitate gaseous exchange, impermeable to organisms and free from particulate or toxic contaminants.

However, the best dressing for post operative wounds healing by secondary intention is unknown. Successful wound management depends on a flexible approach to the selection and use of products based on the understanding of the healing process and a knowledge of the properties of the various dressings available. For example the following choices are a suitable treatment for removal of necrotic tissue; surgical debridement, use of hydrogel dressing, use of hydrocolloids, use of an enzymatic agent, and use of occlusive dressing. Exposure to air will only serve to dry the necrotic tissue more and not allow the moist environment needed for cellular activity. Necrotic tissue requires either moisture in some form or sharp debridement. An infected wound may require surgical revision to facilitate free drainage. An alginate dressing that facilitates haemostasis and absorbs exudate would be appropriate at this stage. More traditional dressings such as gauze packing are difficult to remove and are extremely painful for the patient. Granulating and epithelializing wounds will require protection from further trauma. Dressings that are suitable are alginates, foams or hydrocolloids.

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The aim of cavity wound management is to lightly pack the cavity to maintain free drainage. Absorption of exudate and ease of removal would be the two main considerations. Alginate and cavity foam dressings are the usual treatment of choice as they are easier to use in terms of application. Film dressings are indicated for superficial wounds and will not absorb exudate. The use of medicated dressings should be reserved for wound infection.

There have been drastically improved surgical outcome as compared to the past with the advent of HAART, supported by the preventive measures against occupational HIV transmission, good anaesthetic and preoperative care. The AIDS-related surgical emergencies such as gut (Non-Hodgkin's) lymphoma, infective colitis (bacterial CMV) kaposi sarcoma have declined. With increasing survival of these patients, however, the other non-AIDS related elective or emergency surgery predominate and thus wound care will still be needed for these infected patients.

Conclusion

HIV-AIDS patients should not be discriminated against with regard to receiving appropriate surgical intervention for fear of wound healing problems. Surgical procedures can be safe and effective therapeutic modalities. There are minimal problems with wound healing if wound care for HIV-AIDS patients incorporate the WHO suggestions or the UK NICE guidelines for reduction of wound infection. Continuing wound evaluation and the appraisal of what dressing is useful for the type of wound and stage of healing is the basis of optimum wound care .Adequate nutrition especially in HIV/AIDS patients facilitates wound healing and decrease wound infection by improving immune function. The improved surgical outcomes together with the preventive measures against occupational HIV transmission have resulted in the treatment of HIV/ AIDS patients becoming an accepted part of routine surgical practice.

Minimally invasive surgery is particularly relevant to both the HIV/AIDS patient and the surgeon, as in the former the adverse effect of wound healing and surgical outcome, and in the latter the risks of exposure are both minimised. Optimum wound care, emotional support, health education will enhance both the emotional and physical well-being of the HIV-AIDS patients.

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