

Solid bone cement antibiotic loaded dressing in infected and open wounds

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Abstract

In this new method of treatment of solid dressing which is not absorbed through blood and serum, is non adherent, does not directly compress damage area and does not cause more ischemia and prevent direct pressure over traumatic and infected part. Provide local antibiotic to the affected part. It is because of these reasons it is more effective type of treatment and can prevent infection in all high risk infection after surgery.

Material and Methods: Study is carried out in the department of Orthopaedics, lady Reading Hospital, KPK from January 2017 to December 2018.

Result: We treated 30-total cases in which 6 were having exposed bone and difficult to reconstruct and needed amputation, but they refused amputation. 10-diabetic foot, 4-crush injuries, 10-tibia open fractures which were treated with cement loaded antibiotic cover, without IV or oral antibiotic cover, without use of antiseptic, and we used one pack of cement 2 g of Vancomycin and 1.5 g of Amikacin, and we made them more flat to take form of the defect and cover the affected part of the tissues, before it become hot and warm we took it away from the affected part to not burn the affected area when it became cold then we fixed it over that part which was not reconstructable with muscle flap, local flap, or skin graft. We protected the wound from infection. Protected granulation, protected epithelialization in the edges of the wound, and to prevent accumulation of blood and serous fluid in the defect. We kept one cover of loaded cement up to two weeks and we used it up to full granulation of wound or epithelialization.

Conclusion: Solid dressing as a simple and best method of infection control in tibia open fractures and non union in which skin closure is big problem and protection of hematoma in fractures ends after fixation are protected by this method and we noted healing in 10-complicated tibia fractures without bone graft in which we did skin graft also and we noted cross union between tibia and fibula which has similar result like stem cells implantations

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Introduction:

More recent studies have shown that the rates of clinical infection increased to 1.4% (7/497) for type-I fractures, 3.6% (25/695) for type-II fractures, and to 22.7% (45/198) of type HI fractures.^{1,2} These data are similar to a more recent study on the treatment of open tibia fractures.³ Local antibiotic delivery must be considered when extensive contamination is present. This is commonly done with an “antibiotic bead-

pouch” construct formed with antibiotic powder and polymethylmethacrylate (PMMA) cement. These constructs are available commercially or can also be easily made in the operating room with readily available equipment. A recommended technique we follow includes forming beads over 24-gauge wire with 3.6 g of tobramycin mixed with 40 g of PMMA cement.⁴ The beads are counted and then placed into the wound and covered with an impermeable dress-

ing (i.e., Ioban, 3M, Minneapolis, MN). This simple technique when used in conjunction with systemic antibiotics has been shown to decrease infection rates from 12 to 3.7% in severe open fractures.⁵

All open fractures are by definition contaminated and must be treated as such. The treatment methods may differ depending on the type of fracture. Infection risks also differ by fracture type and have been reported to be ranging from 0 to 2% for type-I fractures, 2 to 10% for type-II fractures, and 10 to 50% for type-III fractures.⁶

Our recommendation is toward primary closure of type-I, type-II, and a few selected type-III A fractures. The most important factors in our decision-making process is the adequacy of the initial debridement and the degree of wound contamination. If there is any doubt regarding the safety of primary closure, we opt to wait until the second surgical debridement and make further treatment decisions at that time. If a primary closure is conducted and there is questionable tissue viability noted post-operatively, we have a very low threshold for reopening the wound 48-72 h after initial closure. If possible, we aim to have coverage completed within 72 h preferably with primary closure. Particular attention must be paid to tension across the wound closure site. Tension may interfere with wound healing by decreasing the vascularity across the incision. Close relationships with plastic and tissue reconstructive teams can facilitate early closure if flap coverage is necessary. A valuable adjunct to wound closure has been the wound vacuum-assisted closure device (VAC; KCI, San Antonio, TX).⁷ It has been shown that this device aids in wound healing by reducing edema, enhancing granulation tissue formation, and increasing local blood flow.^{8,9} We utilize this vacuum-assisted closure concept often when immediate closure is not possible although it is important to realize that this method does not necessarily reduce infection rates or allow a permissible delay in wound closure.^{7,10} The choice between the wound vacuum-assisted closure device and the antibiotic bead-pouch depends on the degree of wound contamination and surgeon preference

However, some authors Joyce et al. and Papanastasi et al. argue that the risk of developing a deep infection with intramedullary nailing of open fractures including Gustillo type-III, can be reduced by the combination of systemic antibiotic treatment to direct local antibiotic therapy in wound.¹¹ These authors say that the combination of systemic antibiotics and direct antibiotics in the wound not only reduces the risk of infection, but also the risk of further surgery for other local complications, they made this observation in comparing a patient group that received systematic and local antibiotic therapy to another group that received only systemic antibiotic therapy. This idea deserves further consideration by randomized comparative studies.

Currently, there is no more debate on washing, surgical debridement in the management of open fractures, but on the other hand the choice of the fixation system remains controversial. The high prevalence of microbial contamination of the open wounds predisposes to the development of infection which is related to the severity of the damage to the soft tissue.² The role of prophylactic antibiotic therapy in the initial management of open fractures is well established.^{13,14}

We treat them with external cement loaded antibiotic cover, without IV or oral antibiotic cover, without use of antiseptic, and we used one pack of cement 2 g of Vancomycin and 1.5 g of Amikacin, and we made them more flat to take form of the defect and cover the defect part of the tissues, before it become hot and warm we take it away from the affected part and prevent it from being burned when it became cold then we fixed it over the affected part which is not reconstructable with muscle flap, local flap or skin graft. We wanted to protect wound from infection. Protect granulation, Protect epithelialization in the edge of wound, and to prevent accumulation of blood and serous fluid in the defect. We kept one cover of loaded cement up to two weeks and we used it until it was full of granulation tissue and epithelialization.

Material and Methods

This study is carried out at Lady Reading Hospital, KPK in department of Orthopaedics from January 2017 to December 2018.

Result:

We treated 30-total cases in which 6 were exposed bone which was difficult unreconstructable cases which needed amputation, but they refused amputation. 10-diabetic foot, 4-crush injuries 10-tibia open fractures, We noted infection control in 28-cases, just two cases failed with old age. After good debridement we did not kept them in hospital and followed all of them OPD based dressing change we reduced hospital stay for these complicated cases to 4-days.

Protection of healing factors from infection and enzymatic destruction which this solid antibiotic loaded cement cover protect epithelial regeneration and granulation tissues we treated 2-exposed bone and 3-exposed tendons of Achilles tendon in lower tibia without any free and rotational tissue flap.

We noted in our observation that the need for Split skin graft was reduced closed to half of diameter to original injury by protection of new epithelialization of skin edges. 2-extensive crushed wounds healed without graft.

Discussion:

We observed from this short series, solid contact of bone cement cover to wound instead of gauze contact over the wound, prevent blood and serum collection over the wound control this media of infection. Prevent direct pressure over the wound provide local high effective level of antibiotic. we noted good healing of skin edges we believe enzymes which are released from blood cells in gauze are prevented in this method.

No need to use antiseptic as we tried to protect healing cells from destruction. Simple and best method of infection control in tibia open fractures and non union in which skin closure is big problem and protection of hematoma in fractures ends after fixation are protected by this method and we did skin graft and nail at the

same time which was extensive and this solid antibiotic cover which we put over the skin graft to control infection and healing in this 10 -complicated tibia fractures without bone graft in which we did skin graft also and we noted cross union between tibia and fibula also has similar result like stem cells implantation and healing in more than 8 cm exposed nail is surprising for us but we think we were able to protect stem cells in skin graft and bone marrow stem cell which were reason of healing below the exposed nail and 10-bad infected fractures which refused amputation

Good way to control external dead space and prevention of infection with exposed bone and tendon is difficult work and needs extensive surgery but we were able to control them as OPD base. There was tissue granulation without drilling of bone in 5 exposed bone,

Conclusion:

We conclude that solid dressing as a simple and best method of infection control in tibia open fractures and non union in which skin closure is big problem and protection of hematoma in fractures ends after fixation are protected by this method and we noted healing in 10-complicated tibia fractures without bone graft in which we did skin graft also and we noted cross union between tibia and fibula which has similar result like stem cells implantations.

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Role and contribution of authors:

Dr Aimal Sattar, collected the data, referenes and did the initial writeup

Dr. Muhammad Ishaq, collected the data and helped in discussion writing.

Dr. Wali Muhammad, collected the references and helped in introduction writing.

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