G62: What is the optimal management of patients with persistent wound drainage who have undergone recent major orthopedic procedures?

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Response/Recommendation: Persistent wound drainage (PWD) after major orthopedic surgery requires a systematic approach. First, rule out infection by checking for local and systemic signs such as erythema, purulence, and fever. If infection is not suspected, apply non-operative measures such as local wound care, risk factors, minimizing motion at the surgical site, and adjusting VTE prophylaxis. If drainage continues beyond seven days despite non-operative management, investigate thoroughly for infection and consider surgical intervention, including irrigation and debridement.

Level of Evidence: Moderate

Delegate Vote:

Rationale:

Definition of Persistent Wound Drainage (PWD)

Persistent Wound Drainage (PWD) refers to continued fluid leakage (serous, serosanguinous, or purulent) from the surgical wound beyond the expected early postoperative period (1-8). Most wound healing disturbance leading to short drainage duration is non-infectious (4, 9). Surgical disruption of the superficial capillaries may cause minor, temporary serous or serosanguinous post operative wound drainage. If drainage persists, work-up for infection is indicated (9). Delayed wound healing may allow pathogens to penetrate deeper tissues, resulting in retrograde infection (5, 10). Studies suggest that the risk of infection increases substantially when drainage lasts more than 5 days (4, 11). There is no comprehensive definition for the duration and amount of PWD. However, studies have reported PWD as lasting from 2 to 9 days post-op (4, 12-14). In 2013 and 2018, the International Consensus Meeting (ICM) on periprosthetic joint infection defined PWD as more than 2×2 cm of drainage on the wound dressing beyond 72 hours

following the initial surgery (15, 16). However, it is essential to recognize that different types of dressings influence both the volume and duration of drainage, which adds complexity to this matter (17).

Differentiating Infectious vs. Non-Infectious Wound Drainage

PWD can be categorized into non-infectious and infectious types. Non-infectious drainage commonly appears early in the postoperative period, though in cases involving certain sealed antibacterial dressings, clinicians may only recognize it after dressing removal. This fluid is often serous or serosanguinous in nature, with no appreciable odor or signs of local tissue destruction. It typically resolves with conservative management once anticoagulation and other modifiable risk factors are addressed (18). Moreover, mild elevations in inflammatory markers are common and may reflect normal postoperative physiology rather than infection (19).

Infectious wound drainage necessitates prompt intervention (6). Systemic and local signs of infection may be present. Systemic signs of infection include fever, chills, and tachycardia. Local signs include erythema, induration and warmth of the surgical site as well as purulent drainage, or the presence of a sinus tract (6, 20). Fever is considered physiological in the first 3 to 5 days after the initial surgery (21-23). Nevertheless, temperatures exceeding 39°C, especially if persistent for multiple days or occurring more than 3-5 days post-surgery, warrant further investigation (4, 24, 25). An infectious complication of PWD should be suspected if CRP levels rise after 72 hours post-TJA or remain elevated for more than 7 days after TJA (5, 26). The ESR and WBC levels are less appropriate for diagnosing infections in cases of PWD (5, 26, 27). Currently, there are no universally established criteria to differentiate infectious PWD from non-infectious PWD.

Non-Operative Management of Persistent Wound Drainage

When no clinical or laboratory indicators suggest infection, conservative strategies should be considered.

Activity Modification and Immobilization

Excessive motion can aggravate drainage, especially early in the postoperative course (28, 29). Restricting joint movement through bracing, discontinuing continuous passive motion, or

temporarily pausing physical therapy can be beneficial. These measures are typically short-term interventions aimed at promoting stable wound healing (30, 31).

Wound Care and Dressings

Wound care plays a central role in managing PWD. Absorbent dressings and pressure bandages are often the first line of management (32, 33). If drainage continues, negative pressure wound therapy (NPWT) can be considered. NPWT has been shown to reduce seromas, hematomas, dehiscence, and infection. NPWT often achieves a dry wound within 24 hours (34), and has been shown to lead to cessation of PWD in the majority of patients (35). Although prophylactic NPWT shows benefit in preventing seroma and hematoma formation, widespread routine use is generally not cost-effective (36). However, it may be considered prophylactically in patients at higher risk for PWD (37).

Anticoagulation Management

Anticoagulation can exacerbate or prolong drainage by contributing to persistent oozing from the surgical site. A short-term cessation of VTE prophylaxis may be justified based on the patient's overall risk and the specific anticoagulant in use (38). Alternatively, switching to an agent with a lower risk of PWD such as aspirin can be an effective strategy if clinically appropriate (4, 38-41). These adjustments should be individualized and closely monitored to balance the benefits of preventing thrombotic events with the risk of complications from prolonged wound drainage.

No Prophylactic antibiotics

The routine use of prophylactic antibiotics has not been shown to reduce the incidence or severity of PWD, nor does it lower the rate of wound infections in this specific scenario (42, 43). As a result, current recommendations are against the use of prophylactic antibiotics in the absence of clear signs of infection.

Risk Factor Optimization

Focusing on modifiable risk factors can significantly influence wound outcomes (Table 1). Good glycemic control in diabetic patients, smoking cessation, and adequate nutritional support—especially in malnourished patients—are critical for promoting wound healing (5, 6, 8, 44-48).

Surgeons should also inspect the incision site, particularly at both ends, to ensure that the closure is adequate; if not, reclosure can prevent continued drainage (49).

Monitoring

Finally, ongoing evaluation of wound drainage is essential. Daily monitoring will help determine if drainage is diminishing, and tracking CRP levels may help detect any developing infection or persistent inflammatory process (19). If these measures do not result in a reduction of drainage within a reasonable time frame, infection must be considered.

Operative Management for Infectious Wound Drainage

If PWD does not improve after several days of conservative management, or if the drainage volume increases, local or systemic signs of infection develop, CRP levels rise, or drainage persists beyond seven days without an identifiable cause, operative management must be strongly considered (12).

Surgical management generally begins with the aspiration of any hematoma; in cases involving TJA, joint aspiration should be performed as well (33). The wound is then explored, with multiple intraoperative samples taken for culture. Thorough debridement of any necrotic or infected tissue is essential. Extensive irrigation is recommended to help clear the surgical site of probable infectious material. In cases of TJA, if the infection involves the joint itself a DAIR procedure along with modular components exchange is recommended (8, 33, 50, 51). After surgery, patients should be started on empiric antibiotic therapy, which is subsequently adjusted once culture results are available (33, 50, 51). In many cases, an extended course of antibiotics is advised to ensure complete resolution of the infection (52).

Limitations

The literature on PWD is limited and mainly focuses on total joint arthroplasty, with varying findings. PWD is multifactorial and patient-specific, making a universal management protocol challenging. The duration for non-infected PWD to consider infected or at risk of infection varies in the literature, and there is no universally accepted definition of infected PWD. High-quality research is needed to develop clear criteria for identifying patients who would benefit most from surgical intervention.

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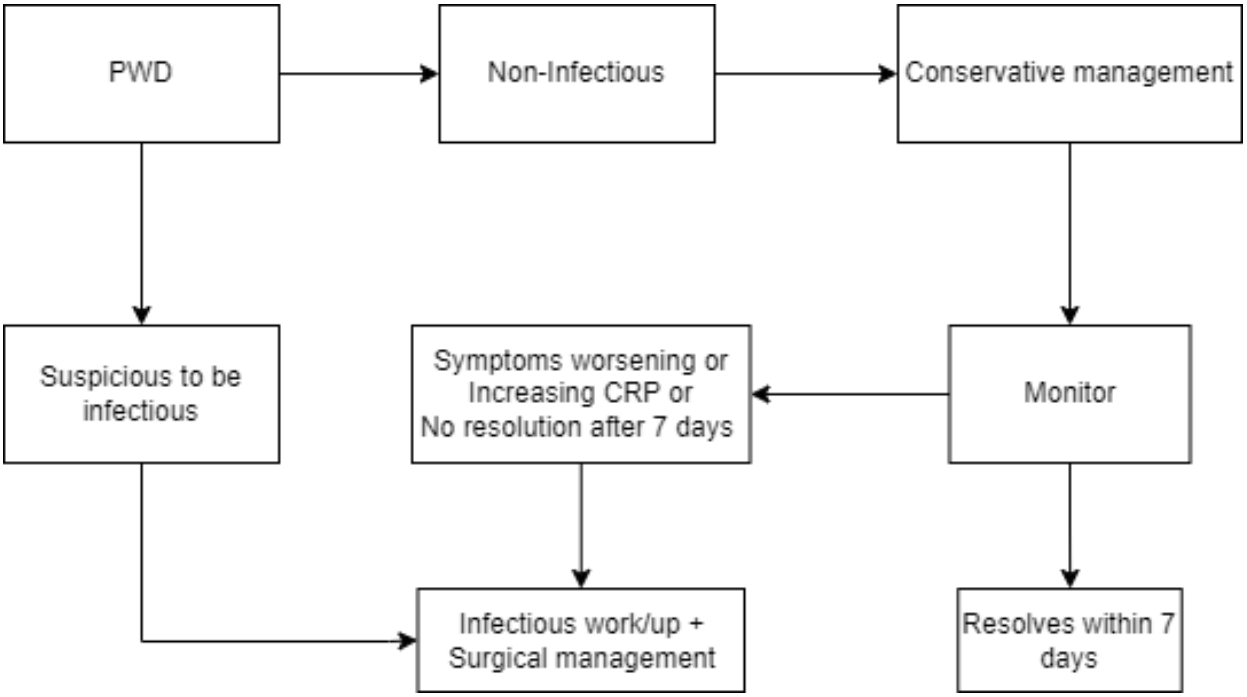
Figures


PWD
Non-Infectious
Conservative management
Suspicious to be infectious
Symptoms worsening or Increasing CRP or No resolution after 7 days
Monitor
Infectious work/up + Surgical management
Resolves within 7 days