

INTISARI

Perawatan Luka yang Ekonomis dan Efektif sebagai Proses Persiapan Cangkok Kulit Bedah Lanjut dengan Menggunakan Inovasi *Reverse Aqua Pump-Vacuum Assisted Closure*

Meirizal¹, Rahadyan Magetsari¹, Mohammad Rizal Chaidir², Sumadi Lukman Anwar³.

¹Divisi Orthopaedi dan Traumatologi, Departemen Bedah, RSUP Dr. Sardjito, Yogyakarta, Indonesia., Universitas Gadjah Mada.

²Divisi Tangan Lengan Bedah Mikro, Departemen Orthopaedi and Traumatologi, RSUP Dr. Hasan Sadikin, Bandung, Indonesia., Universitas Padjajaran.

³Divisi Bedah Onkologi, Departemen Bedah, RSUP Dr. Sardjito Hospital, Yogyakarta, Indonesia., Universitas Gadjah Mada.

Latar belakang: *Vacuum Assisted Closure* (VAC) yang telah lama diperkenalkan terbukti efektif mempercepat penyembuhan, namun biayanya tinggi sehingga terbatas di negara berkembang seperti Indonesia. Meski banyak inovasi dilakukan, belum ada inovasi yang mendasar pada komponen utama VAC. Pengembangan *reverse aqua pump*, RAP-VAC sebagai solusi yang lebih murah dan efikasi yang setara dengan VAC komersial.

Tujuan: Penelitian ini bertujuan untuk menganalisis luaran klinis dan biaya perawatan pasien dengan luka yang membutuhkan bedah rekonstruksi lanjut cangkok kulit yang dirawat dengan RAP-VAC.

Metode Penelitian: Studi eksperimental dengan desain *non-inferiority randomized controlled trial*, intervensi menggunakan RAP-VAC dan kontrol menggunakan VAC komersial. Efektivitas alat dilakukan uji komparatif dan korelasi antara dua kelompok VAC, dengan analisis sub-grup variabel luar menggunakan regresi linear dan efektivitas biaya dengan *Incremental Cost-Effectiveness Ratio* (ICER).

Hasil. Sebanyak 24 subjek (12 RAP-VAC dan 12 kontrol) dianalisis tanpa perbedaan karakteristik dasar yang signifikan. Derajat granulasi luka tidak menunjukkan perbedaan bermakna dari hari pertama (H0) hingga hari terakhir perawatan (HE) ($p = 0,877$), dan analisis subkelompok menunjukkan bahwa kondisi *bone exposed* tidak berpengaruh signifikan terhadap perkembangan granulasi luka. Durasi penggunaan VAC juga tidak berbeda signifikan antara kedua kelompok ($p = 0,805$). Pada status infeksi, indikator CRP menunjukkan korelasi penurunan yang signifikan pada kelompok RAP-VAC ($r = 0,754$; $p = 0,005$). Tingkat kenyamanan pasien, yang diukur dengan VAS, CRS, dan kebisingan alat (dB), tidak menunjukkan perbedaan bermakna antar-kelompok. Biaya perawatan RAP-VAC jauh rendah dibandingkan VAC komersial ($p < 0,001$), dengan nilai ICER negatif yang menegaskan keunggulan *cost-effectiveness* RAP-VAC.

Kesimpulan. Penggunaan RAP-VAC menunjukkan efektivitas yang setara dengan VAC komersial dengan biaya perawatan yang jauh lebih rendah.

Kata kunci: *Vacuum Assisted Closure*, Penyembuhan Luka, Analisis Efektivitas Biaya, Uji Klinis Acak Terkendali.

ABSTRACT

Effective Wound Care and Economical as a Preparation Process for Advanced Skin Graft Surgery Using the Reverse Aqua Pump–Vacuum Assisted Closure Innovation

Meirizal¹, Rahadyan Magetsari¹, Mohammad Rizal Chaidir², Sumadi Lukman Anwar³.

¹Orthopedics and Traumatology Division, Surgery Department, RSUP Dr. Sardjito Hospital, Yogyakarta, Indonesia., Universitas Gadjah Mada.

²Hand and Microsurgery Division, Orthopedics and Traumatology Department, RSUP Dr. Hasan Sadikin Hospital, Bandung, Indonesia., Universitas Padjajaran.

³Oncology Surgery Division, Surgery Department, RSUP Dr. Sardjito Hospital, Yogyakarta, Indonesia., Universitas Gadjah Mada.

Background: *Vacuum Assisted Closure (VAC), which has long been introduced, has proven effective in accelerating wound healing, but its high cost limits its use in developing countries such as Indonesia. Although many innovations have been made, none have fundamentally addressed the core components of VAC. The development of the reverse aqua pump (RAP-VAC) offers a more affordable solution with efficacy comparable to commercial VAC systems.*

Objective: *This study aims to evaluate the clinical outcomes and treatment costs of patients with wound defects requiring further reconstructive surgery with skin grafts who are treated using RAP-VAC.*

Methods: *An experimental study with a non-inferiority randomized controlled trial design was conducted, in which the intervention group used RAP-VAC and the control group used commercial VAC. The effectiveness of the devices was assessed through comparative and correlation analyses between the two VAC groups, with subgroup analysis of external variables performed using linear regression, and cost-effectiveness using the Incremental Cost-Effectiveness Ratio (ICER).*

Result. *A total of 24 subjects (12 RAP-VAC and 12 control) were analyzed, with no significant differences in baseline characteristics. The degree of wound granulation showed no significant difference from the first day (H0) to the final day of treatment (HE) ($p = 0.877$), and subgroup analysis indicated that bone exposure did not significantly affect granulation development. The duration of VAC use was also not significantly different between groups ($p = 0.805$). Regarding infection status, CRP demonstrated a significant correlation with reduction in infection in the RAP-VAC group ($r = 0.754$; $p = 0.005$). Patient comfort levels, measured by VAS, CRS, and device noise (dB), showed no significant difference between groups. The treatment cost of RAP-VAC was substantially lower than that of commercial VAC ($p < 0.001$), with a negative ICER value confirming the superior cost-effectiveness of RAP-VAC.*

Conclusion. *The use of RAP-VAC demonstrated comparable effectiveness to commercial VAC while offering lower treatment costs.*

Keywords: *Vacuum Assisted Closure, Wound Healing, Cost Effective Analysis, Randomized Controlled Trial*