# Does Wound Vacuum-Assisted Closure Temporization Offer Similar Patient-Perceived Health and Functional Status as Single-Stage Excision after Sarcoma Resection?

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INTRODUCTION: Vacuum-assisted closure (VAC) temporization is a promising technique for achieving local control in aggressive soft tissue sarcomas, including myxofibrosarcoma. The distinctive comet tail appearance and invasive character of myxofibrosarcomas pose challenges during intraoperative margin assessments, thereby increasing the risk of false-negative readings on pathology. Residual tumor from positive (R1) margins after primary soft tissue coverage complicates local control by increasing the risk of local recurrence. Despite its positive profile, adoption of VAC temporization remains limited, primarily due to the scarcity of patient-reported outcome data supporting its efficacy. Our study sought to examine and compare the patient-reported performance of VAC temporization vs. single-stage (SS) excision/reconstruction in patients undergoing surgical resection for myxofibrosarcoma.

METHODS: A retrospective analysis of myxofibrosarcoma patients who underwent surgical resections at our institution from 2000 to 2020 was conducted. Patients treated with VAC temporization were compared to those undergoing (SS) excision/reconstruction. The standardized Patient-Reported Outcomes Measurement Information System (PROMIS) was used to assess physical and mental health and physical function. Scores for PROMIS Global Health (Physical & Mental) and Physical Function Short Form 10a were compared between groups. Pain was assessed using a visual analog scale (VAS). Absolute scores and differences between post- and preoperative scores at the one-month, three-month, six-month, one-year, and two-year timepoints were compared.

RESULTS: A total of 79 patients were included in our study, with 32 and 47 patients in the SS group and 47 patients in the VAC group. Overall demographic and preoperative clinical variables were similar between the two groups. While length of stay was higher in the VAC group (10 vs. 2 days, p<0.001), there were significantly more patients in the SS group who required post-discharge tumor bed re-excisions (6 vs. 1, p=0.019). One-year differential physical function, as measured by the PROMIS Physical Function Short Form 10a, was better in the SS group (2.4 vs. -2.45, p=0.001). All remaining absolute and differential PROMIS and VAS pain scores were similar between groups at all timepoints. Both groups reported decreases in their PROMIS scores and an increase in VAS pain scores one month postoperatively. By the two-year follow up, nearly all scores had returned to their preoperative values.

DISCUSSION AND CONCLUSION: Patient-reported postoperative outcomes for those treated with VAC temporization are comparable to those of SS excision/reconstruction. Although this study is not a randomized controlled trial, its findings could potentially influence the current treatment paradigm for locally invasive soft tissue sarcomas. The trends for patient-reported postoperative outcomes provide valuable insight for physicians when discussing treatment options with their patients and managing their expectations.

**Table 1.** Demographic, clinical, and treatment characteristics of myxofibrosarcoma patients

| | All patients (n=79) | Single stage (n=32) | VAC temporization (n=47) | p |
|---|---|---|---|---|
| **Age*** | 69 (59-82) | 67 (55-77) | 72 (62-83) | 0.22 |
| **Female sex** | 17 (31%) | 5 (21%) | 12 (40%) | 0.13 |
| **Race** | | | | 0.45 |
| White | 43 (93%) | 19 (90%) | 24 (96%) | |
| Black | 3 (7%) | 2 (10%) | 1 (4%) | |
| **Age-adjusted CCI*** | 6 (4-7) | 6 (4-6.5) | 6 (5-7) | 0.21 |
| **"Oops" resection** | 13 (24%) | 4 (17%) | 9 (30%) | 0.25 |
| **Stage (AJCC 8th Ed.)** | | | | 0.81 |
| I | 4 (7%) | 2 (8%) | 2 (7%) | |
| II | 16 (30%) | 6 (25%) | 10 (33%) | |
| III | 31 (57%) | 14 (58%) | 17 (57%) | |
| IV | 3 (6%) | 2 (8%) | 1 (3%) | |
| **Grade** | | | | 0.46 |
| 1 | 4 (8%) | 2 (8%) | 2 (7%) | |
| 2 | 22 (42%) | 12 (50%) | 10 (34%) | |
| 3 | 27 (51%) | 10 (42%) | 17 (59%) | |
| **Size (cm)*** | 6 (4.1-8.1) | 6 (4.3-10) | 5.8 (4-7.3) | 0.24 |
| **Volume ($cm^3$)*** | 72 (19-210) | 103 (24-240) | 53 (15-131) | 0.14 |
| **Tumor depth** | | | | 0.22 |
| Suprafascial | 32 (59%) | 12 (50%) | 20 (67%) | |
| Subfascial | 22 (41%) | 12 (50%) | 10 (33%) | |
| **Location** | | | | 0.18 |
| Upper extremity | 13 (24%) | 4 (17%) | 9 (30%) | |
| Lower extremity | 35 (65%) | 15 (63%) | 20 (67%) | |
| Trunk | 5 (9%) | 4 (17%) | 1 (3%) | |
| Head & neck | 1 (2%) | 1 (4%) | 0 (0%) | |
| **Creatinine > 1.5 mg/dL** | 2 (10%) | 1 (10%) | 1 (9%) | 0.94 |
| **Albumin < 3.5 g/dL** | 0 (0%) | 0 (0%) | 0 (0%) | |
| **Hemoglobin < 10 g/dL** | 1 (4%) | 1 (10%) | 0 (0%) | 0.24 |
| **Radiation therapy** | 48 (89%) | 20 (83%) | 28 (93%) | 0.25 |
| **Chemotherapy** | 2 (4%) | 2 (8%) | 0 (0%) | 0.11 |
| **Length of stay (days)*** | 4 (1.5-11) | 2 (1-4) | 10 (3-14) | **<0.001** |
| **Use of flap for closure** | 35 (65%) | 10 (42%) | 25 (83%) | **0.001** |
| **Excision during sentinel management (n)*** | 1 (0, 1) | 1 (0-1) | 1 (1-2) | **0.042** |
| **Total number of tumor excisions (n)*** | 1 (1, 2) | 1 (1-1) | 2 (1-2) | **0.008** |
| **Post-discharge tumor bed re-excision** | 7 (13%) | 6 (25%) | 1 (3%) | **0.019** |

*AJCC:* American Joint Committee on Cancer; *CCI:* Charlson Comorbidity Index; *VAC:* Vacuum-assisted closure
**Median (IQR)*

**Table 2.** Absolute PROMIS and VAS pain scores of myxofibrosarcoma patients in both groups

| Time after surgery | Survey | Single stage (n=32) | VAC temporization (n=47) | p |
|---|---|---|---|---|
| 1 month | Global Health Physical | 49.25 (34.9, 57.7) | 47.7 (44.9, 50.8) | 0.85 |
| | Global Health Mental | 53.3 (44.7, 62.5) | 55.65 (53.3, 56) | 0.79 |
| | Physical Function SF10a | 39.7 (36.3, 49.4) | 36.4 (32, 41) | 0.13 |
| | VAS Pain* | 2.5 (1, 8) | 1 (1, 3) | 0.31 |
| 3 months | Global Health Physical | 54.1 (34.9, 61.9) | 44.9 (37.4, 50.8) | 0.45 |
| | Global Health Mental | 62.5 (50.8, 67.6) | 50.8 (43.5, 56) | 0.12 |
| | Physical Function SF10a | 43.5 (37, 53) | 36.4 (34, 47.7) | 0.43 |
| | VAS Pain* | 2 (0, 4) | 0.5 (0, 2) | 0.31 |
| 6 months | Global Health Physical | 42.3 (37.4, 57.7) | 47.7 (41.05, 55.9) | 0.77 |
| | Global Health Mental | 50.8 (41.1, 56) | 50.8 (44.65, 59) | 0.85 |
| | Physical Function SF10a | 46.6 (37.2, 55.3) | 42.6 (37.1, 49.4) | 0.43 |
| | VAS Pain* | 2 (0, 3) | 1.5 (0, 2) | 0.60 |
| 1 year | Global Health Physical | 54.1 (50.8, 61.9) | 49.25 (41.05, 59.8) | 0.54 |
| | Global Health Mental | 53.3 (48.3, 59) | 52.05 (44.65, 60.75) | 0.51 |
| | Physical Function SF10a | 51.2 (44.4, 55.3) | 45.05 (37.85, 54.6) | 0.22 |
| | VAS Pain* | 1 (0, 3) | 0.5 (0, 2) | 0.39 |
| 2 years | Global Health Physical | 52.45 (47.7, 59.7) | 50.8 (47.7, 61.9) | 0.23 |
| | Global Health Mental | 53.3 (49.55, 65.05) | 53.3 (48.3, 62.5) | 0.68 |
| | Physical Function SF10a | 50.1 (44.4, 55.8) | 47.9 (42.6, 55.8) | 0.35 |
| | VAS Pain* | 2 (0, 3) | 0 (0, 3) | 0.93 |

*IQR:* Interquartile range; *PROMIS:* Patient-Reported Outcomes Measurement Information System; *SF:* Short form; *VAC:* Vacuum-assisted closure; *VAS:* Visual analog scale
*PROMIS instruments include Global Health (Physical and Mental) and Physical Function SF10a*
**Measured on a scale of 1-10*

**Table 3.** Comparison of postoperative PROMIS and VAS pain scores between groups at different time points

| Time after surgery | Survey | Single stage (n=32) | VAC temporization (n=47) | p |
|---|---|---|---|---|
| | | Median difference between preoperative score (IQR) | | |
| 1 month | Global Health Physical | -10 (-15.9, 3.6) | -10 (-12.8, -9.2) | 0.99 |
| | Global Health Mental | -5.1 (-12.2, 3.5) | -7 (-7.2, -3) | 0.88 |
| | Physical Function SF10a | -5.4 (-12.7, -7) | -17.9 (-28.9, -6.35) | 0.06 |
| | VAS Pain* | 3 (-3, 8) | 1 (-1, 3) | 0.65 |
| 3 months | Global Health Physical | 0 (0, 3.3) | -1.65 (-7.95, 5.25) | 0.56 |
| | Global Health Mental | 7 (0, 8.6) | -4.7 (-9.75, 3.85) | 0.11 |
| | Physical Function SF10a | -2.15 (-4.1, 3.1) | -7.65 (-12.85, -.85) | 0.24 |
| | VAS Pain* | -0.5 (-1, 1) | -1 (-3, 0) | 0.27 |
| 6 months | Global Health Physical | 0 (-4.2, 2.5) | -4.35 (-7.5, 5.1) | 0.31 |
| | Global Health Mental | -2.5 (-8.6, 5) | 0 (-8.2, 2.5) | 0.91 |
| | Physical Function SF10a | -4.6 (-6.1, 4.4) | -5.1 (-14, 0) | 0.19 |
| | VAS Pain* | -0.5 (-2, 1) | 0 (-1, 2) | 0.38 |
| 1 year | Global Health Physical | 3.6 (0, 9.2) | -2.4 (-6.4, 3.3) | 0.054 |
| | Global Health Mental | 0 (0, 5.1) | -2.5 (-5.7, 2.5) | 0.16 |
| | Physical Function SF10a | 2.4 (0, 8.2) | -2.45 (-9.2, 0) | **0.001** |
| | VAS Pain* | -0.5 (-2.5, 0) | -1 (-1, 0) | 0.63 |
| 2 years | Global Health Physical | 0 (-2, 6.4) | -1.65 (-6.9, 6.9) | 0.23 |
| | Global Health Mental | 0 (-5, 8.6) | 0 (-3, 0) | 0.68 |
| | Physical Function SF10a | 2.85 (-3.35, 6.15) | 0 (-6.1, 2.6) | 0.35 |
| | VAS Pain* | 0 (-3, 1) | 0 (-1, 0) | 0.93 |

*IQR:* Interquartile range; *PROMIS:* Patient-Reported Outcomes Measurement Information System; *SF:* Short form; *VAC:* Vacuum-assisted closure; *VAS:* Visual analog scale
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