

Comparison Of Perclose® Vascular Closure Device Vs Figure Of Eight Stitch For Large Bore Venous Access Hemostasis After Percutaneous Cardiovascular Procedures: A Meta-analysis Of Comparative Studies

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BACKGROUND

A number of percutaneous procedures including structural, pulmonary vasculature and electrophysiological procedures are performed using large bore venous access. With larger devices, it has become more routine to use techniques other than manual compression for hemostasis and two of the most common are suture mediated Perclose style device (SMD) and figure of eight (FOE) stitch. We performed a systematic review and meta-analysis comparing SMD and FOE techniques.

METHODS

A systematic search was performed in PubMed, Google scholar, and EMBASE from inception through Nov 30, 2024. Access site hematoma, time to hemostasis (TTH), time to ambulation (TTA), total complications and risk of major bleeding were analyzed to estimate risk ratio (RR) and mean difference (MD). Meta-analysis with random effects model and 95% confidence interval (CI) was performed while I² statistics assessed heterogeneity.

RESULTS

We identified 4 studies with 345 patients (175 SMD; 170 FOE) meeting our study criteria. Compared to FOE, SMD resulted in reduction in access site hematoma [RR 0.45 (95% CI; 0.23 to 0.88), P= 0.02], total complications [RR 0.64 (95% CI; 0.42 to 0.97), P=0.03], TTH [MD -5.05 minutes (95% CI; -6.35 to -3.75) P<0.00001], and TTA [MD -159.22 minutes (95% CI; -193.02 to -125.42), P<0.00001]. There were no significant differences in major bleeding [RR 0.85 (95% CI; 0.41 to 1.76), P=0.66] between the two groups.

Access site hematoma

| SM | D | FO | E | | Risk ratio | Risk ratio | | |
|---|---|--|---|--|--|--|--|--|
| Events | Total | Events | Total | Weight | IV, Random, 95% CI | IV, Random, 95% CI | | |
| 2 | 40 | 4 | 40 | 16.4% | 0.50 [0.10 , 2.58] | | | |
| 0 | 47 | 2 | 53 | 4.9% | 0.23 [0.01, 4.57] | | | |
| 0 | 20 | 2 | 20 | 5.0% | 0.20 [0.01, 3.92] | | | |
| 8 | 63 | 16 | 62 | 73.8% | 0.49 [0.23 , 1.07] | - | | |
| | 170 | | 175 | 100.0% | 0.45 [0.23 , 0.88] | • | | |
| 10 | | 24 | | | | - | | |
| Z = 2.33 (F | P = 0.02 | | | | | 0.01 0.1 1 10 100 | | |
| Test for subgroup differences: Not applicable | | | | | | | | |
| | 2 0 0 8 10 Z = 2.33 (Frences: No | 2 40 0 47 0 20 8 63 170 Z = 2.33 (P = 0.02) | 2 40 4 0 47 2 0 20 2 8 63 16 170 10 24 Z = 2.33 (P = 0.02) rences: Not applicable | 2 40 4 40 0 47 2 53 0 20 2 20 8 63 16 62 170 175 10 24 Z = 2.33 (P = 0.02) rences: Not applicable | 2 40 4 40 16.4% 0 47 2 53 4.9% 0 20 2 20 5.0% 8 63 16 62 73.8% 170 175 100.0% Z = 2.33 (P = 0.02) | 2 40 4 40 16.4% 0.50 [0.10, 2.58] 0 47 2 53 4.9% 0.23 [0.01, 4.57] 0 20 2 20 5.0% 0.20 [0.01, 3.92] 8 63 16 62 73.8% 0.49 [0.23, 1.07] 170 175 100.0% 0.45 [0.23, 0.88] 24 Z = 2.33 (P = 0.02) rences: Not applicable | | |

Total complications

| | SM | D | FO | E | | Risk ratio | Risk ratio |
|-----------------------------------|-------------------------|-----------|--------------|-------------------------|--------|--------------------|--------------------|
| Study or Subgroup | Events | Total | Events | Total | Weight | IV, Random, 95% CI | IV, Random, 95% CI |
| Geis 2015 | 6 | 40 | 9 | 40 | 20.0% | 0.67 [0.26 , 1.70] | |
| Ali 2023 | 5 | 47 | 6 | 53 | 14.0% | 0.94 [0.31, 2.88] | |
| Lodhi 2023 | 4 | 20 | 7 | 20 | 15.6% | 0.57 [0.20 , 1.65] | • |
| Tilz 2024 | 13 | 63 | 22 | 62 | 50.5% | 0.58 [0.32 , 1.05] | |
| Total | | 170 | | 175 | 100.0% | 0.64 [0.42 , 0.97] | • |
| Total events: | 28 | | 44 | | | | |
| Test for overall effect: | Z = 2.11 (F | P = 0.03 | | | | | 0.2 0.5 1 2 |
| Test for subgroup diffe | Favours SMD Favours FOE | | | | | | |
| Heterogeneity: Tau ² = | 0.00; Chi ² | = 0.60, d | f = 3 (P = 0 | 0.90); I ² = | 0% | | |

Time to hemostasis

| | | SMD | | | FOE | | | Mean difference | Mean di | fference |
|---|-----------|-----------|----------|-------------|------|-------|--------|-----------------------|------------|------------|
| Study or Subgroup | Mean | SD | Total | Mean | SD | Total | Weight | IV, Random, 95% CI | IV, Rando | m, 95% CI |
| Ali 2023 | 6.33 | 3.12 | 47 | 12 | 3.81 | 53 | 53.5% | -5.67 [-7.03 , -4.31] | - | |
| Tilz 2024 | 1.33 | 0.76 | 63 | 5.67 | 6.07 | 62 | 46.5% | -4.34 [-5.86 , -2.82] | - | |
| Total | | | 110 | | | 115 | 100.0% | -5.05 [-6.35 , -3.75] | • | |
| Test for overall effect: | -10 -5 0 | 5 10 | | | | | | | | |
| Test for subgroup differences: Not applicable | | | | | | | | | Favors SMD | Favors FOE |
| Heterogeneity: Taus = | 0.34 Chi2 | = 1 63 df | - 1 (P - | U 3U/- Is = | 30% | | | | | |

Time to ambulation

| | | SMD | | | FOE | | | Mean difference | Mean difference |
|-----------------------------------|-----------------------|-------------------------|-----------|-------------------------|--------|-------|--------|-----------------------------|--------------------|
| Study or Subgroup | Mean | SD | Total | Mean | SD | Total | Weight | IV, Random, 95% CI | IV, Random, 95% CI |
| Ali 2023 | 340 | 157.54 | 47 | 463 | 213.37 | 53 | 18.5% | -123.00 [-196.00 , -50.00] | |
| Tilz 2024 | 117 | 59.18 | 63 | 284.43 | 73.39 | 62 | 81.5% | -167.43 [-190.82 , -144.04] | - |
| Total | | | 110 | | | 115 | 100.0% | -159.22 [-193.02 , -125.42] | • |
| Test for overall effect: | -200 -100 0 100 200 | | | | | | | | |
| Test for subgroup diffe | Favors SMD Favors FOE | | | | | | | | |
| Heterogeneity: Tau ² = | 222.25: Ch | ni ² = 1.29. | df = 1 (P | = 0.26); I ² | = 23% | | | | |

CONCLUSION

This meta-analysis of large bore venous access closure shows lower rates of access site hematoma, total complications, TTH and TTA in suture mediated vascular closure device compared to FOE technique.

DISCLOSURES

Authors have no disclosures.

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