

# **Intraoperative Pneumatic Tourniquet Use May Improve the Clinical Outcomes of AV Fistula Creations**

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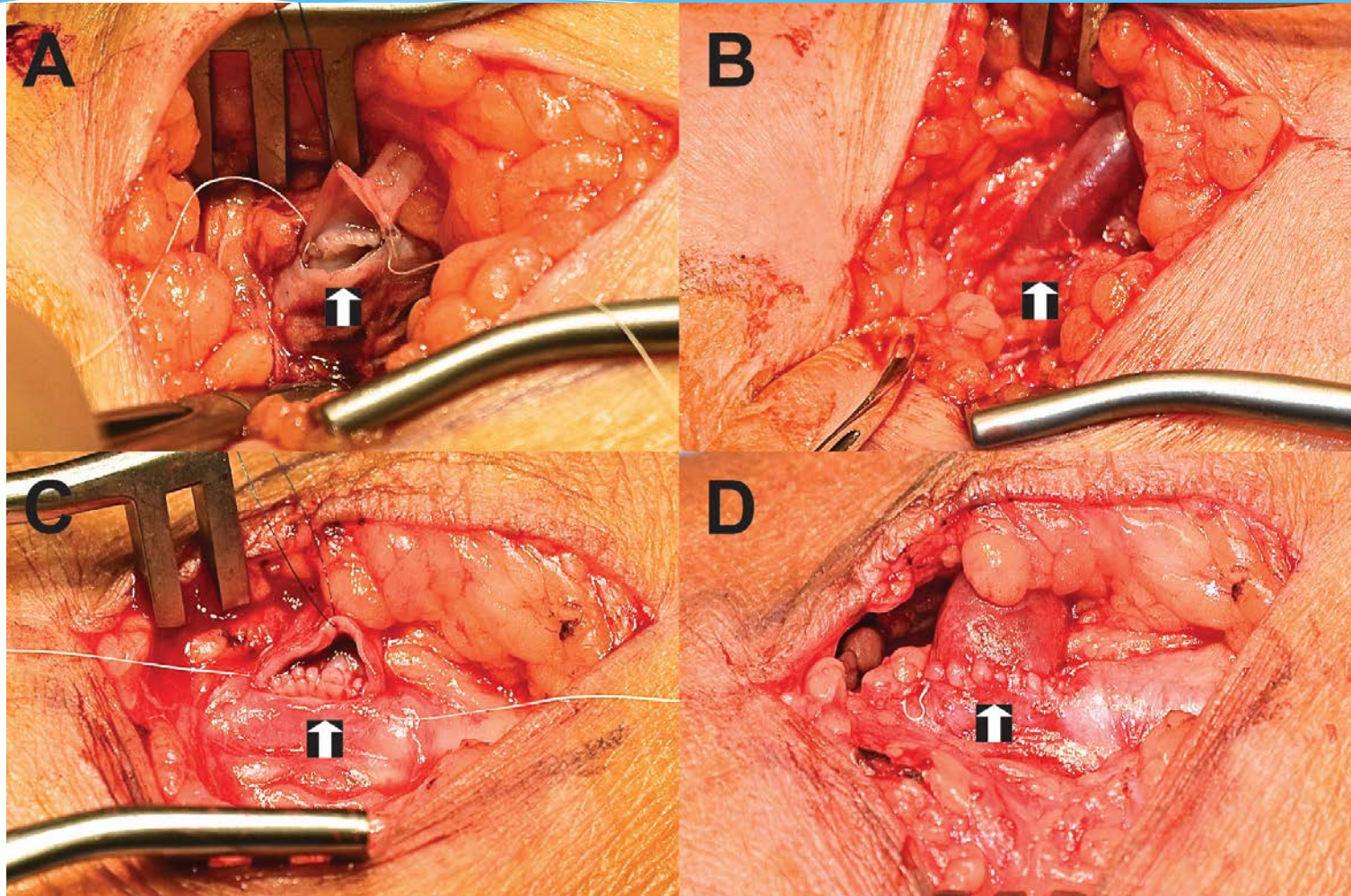
# Disclosure

**No relevant financial or other conflict of interest to disclose.**

# Background and Objectives

- \* Major studies have reported primary arteriovenous fistula (AVF) failure rate as high as 60%.**
- \* While there may be many factors contributing to AVF failure, a commonly cited pathology is stenosis in the juxta-anastomosis region.**
- \* Intraoperative pneumatic tourniquet use during AVF creations reduces the extent of vessel dissections and eliminates the use of vascular clamps, which may then reduce trauma and the development of juxta-anastomosis stenosis.**
- \* However, the potential clinical benefits of pneumatic tourniquet use in AVF surgeries have not been well documented.**
- \* The objective of this study is to compare the outcomes of AVF creations using pneumatic tourniquet-assisted approach vs vascular clamp-assisted approach.**

# Tourniquet-assisted AVF Creations (TAC)



# Inclusion/Exclusion Criteria

- \* To minimized the factors that may affect the outcomes of AVF creations, the following criteria were applied to selecting patients:**
- \* Had inflow artery diameter  $\geq 2\text{mm}$  and anastomosing vein diameter  $\geq 2.5\text{mm}$  on preoperative ultrasound**
- \* Started hemodialysis before surgery or during follow-up (in order to assess the cannulation of these fistulas)**
- \* Did not require fistula vein superficialization (may introduce variables)**
- \* Were not enrolled in any clinical study**
- \* Had adequate follow-up for assessing fistula use or failure**
- \* Secondary AVF using dilated veins from prior AV accesses were excluded.**

# Clinical Data

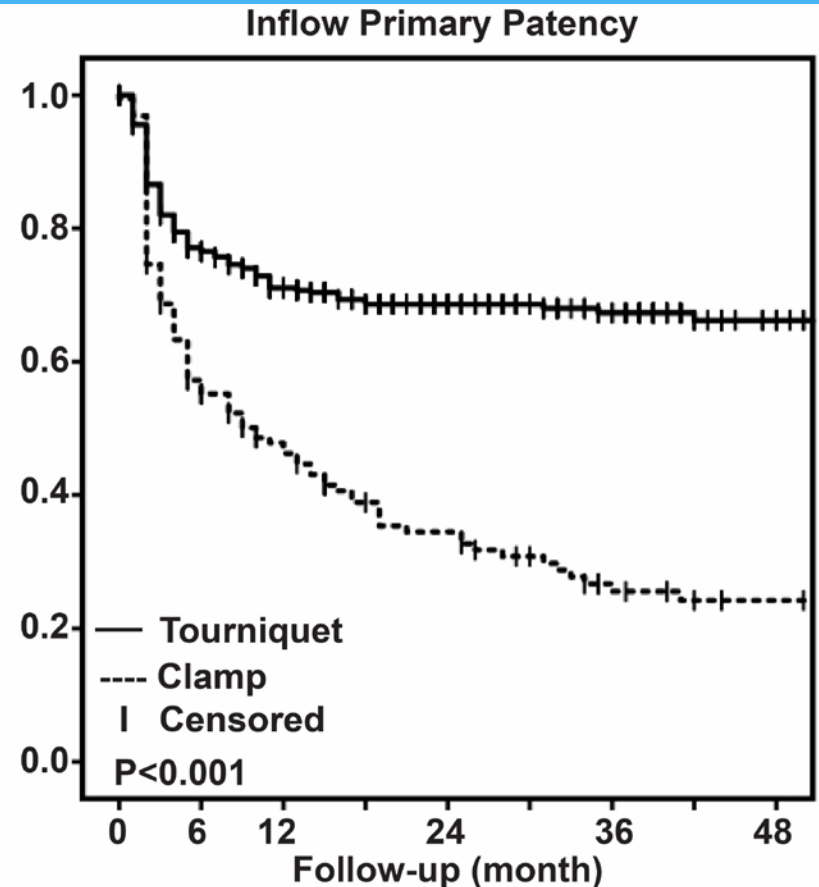
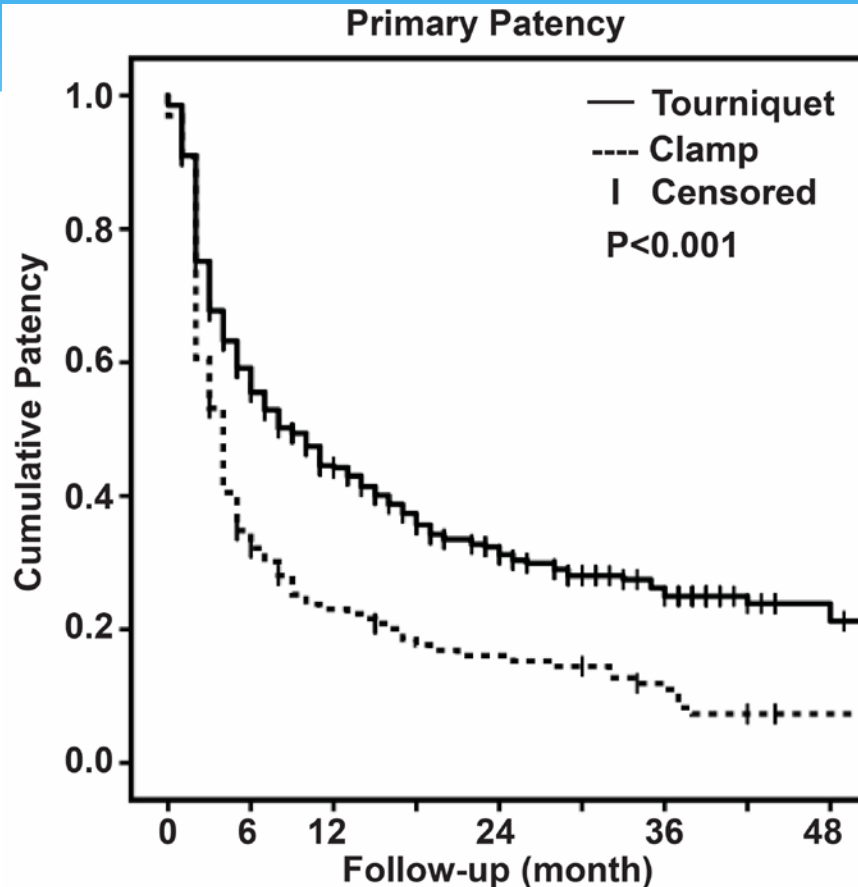
| * Clinical data         | Tourniquet group<br>(n=411) | Clamp group<br>(n=164) | P value |
|-------------------------|-----------------------------|------------------------|---------|
| * Age, years            | 60.1±14.7                   | 60.7±15.3              | 0.65    |
| * Men                   | 297 (72.2%)                 | 104 (63.4%)            | 0.04    |
| * Diabetes mellitus     | 247 (60.1%)                 | 105 (64.0%)            | 0.40    |
| * Antiplatelet agent    | 130 (31.6%)                 | 54 (32.9%)             | 0.77    |
| * Warfarin/Xa inhibitor | 29 (7.1%)                   | 8 (4.9%)               | 0.45    |
| * AVF location          |                             |                        | 0.02    |
| * Upper arm             | 258 (62.8%)                 | 86 (52.4%)             |         |
| * Forearm               | 153 (37.2%)                 | 78 (47.6%)             |         |
| * Follow-up, months     | 30.3±21.0                   | 45.9±34.5              | 0.001   |

# Clinical Outcomes of AV Fistulas

| Clinical outcomes           | Tourniquet group<br>(n=411) | Clamp group<br>(n=164) | P value |
|-----------------------------|-----------------------------|------------------------|---------|
| * Primary failure           | 10 (2.4%)                   | 12 (7.3%)              | 0.01    |
| * Upper arm (258/86)        | 3 (1.2%)                    | 6 (7.0%)               | 0.01    |
| * Forearm (153/78)          | 7 (4.6%)                    | 6 (7.7%)               | 0.37    |
| * Used for dialysis         | 401 (97.6%)                 | 152 (92.7%)            | 0.01    |
| * Upper arm (258/86)        | 255 (98.8%)                 | 80 (93.0%)             | 0.01    |
| * Forearm (153/78)          | 146 (95.4%)                 | 72 (92.3%)             | 0.37    |
| * Used without intervention | 294 (71.5%)                 | 74 (45.1%)             | 0.001   |
| * Upper arm (258/86)        | 197 (76.3%)                 | 42 (48.8%)             | 0.001   |
| * Forearm (153/78)          | 97 (63.4%)                  | 32 (41.0%)             | 0.001   |
| * Used after intervention   | 107 (26.0%)                 | 78 (47.6%)             | 0.001   |
| * Upper arm (258/86)        | 58 (22.5%)                  | 38 (44.2%)             | 0.001   |
| * Forearm (153/78)          | 49 (32.0%)                  | 40 (51.3%)             | 0.006   |

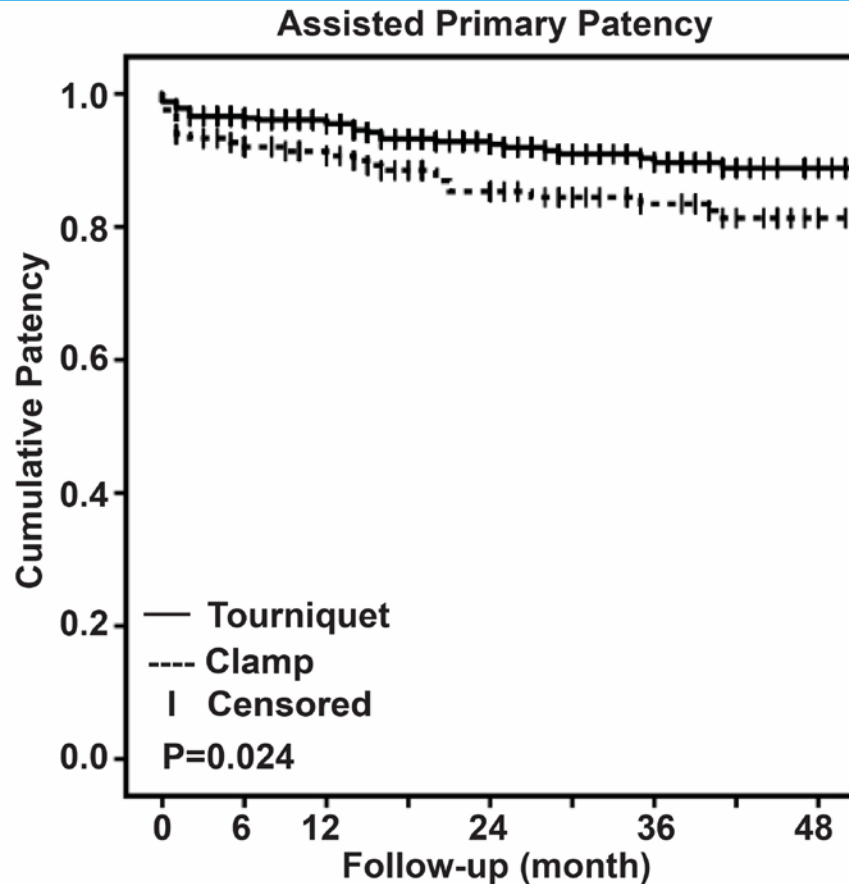


# Primary Patency (Kaplan-Meier Curves): the Whole Circuit and the Inflow Region

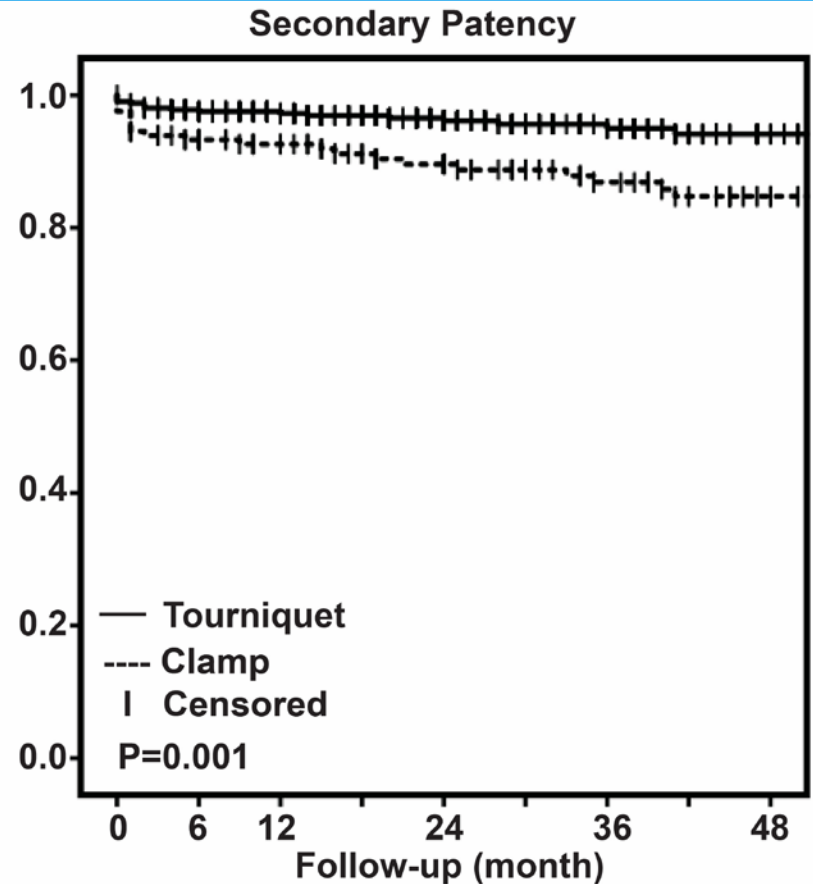




# Assisted Primary and Secondary Patency

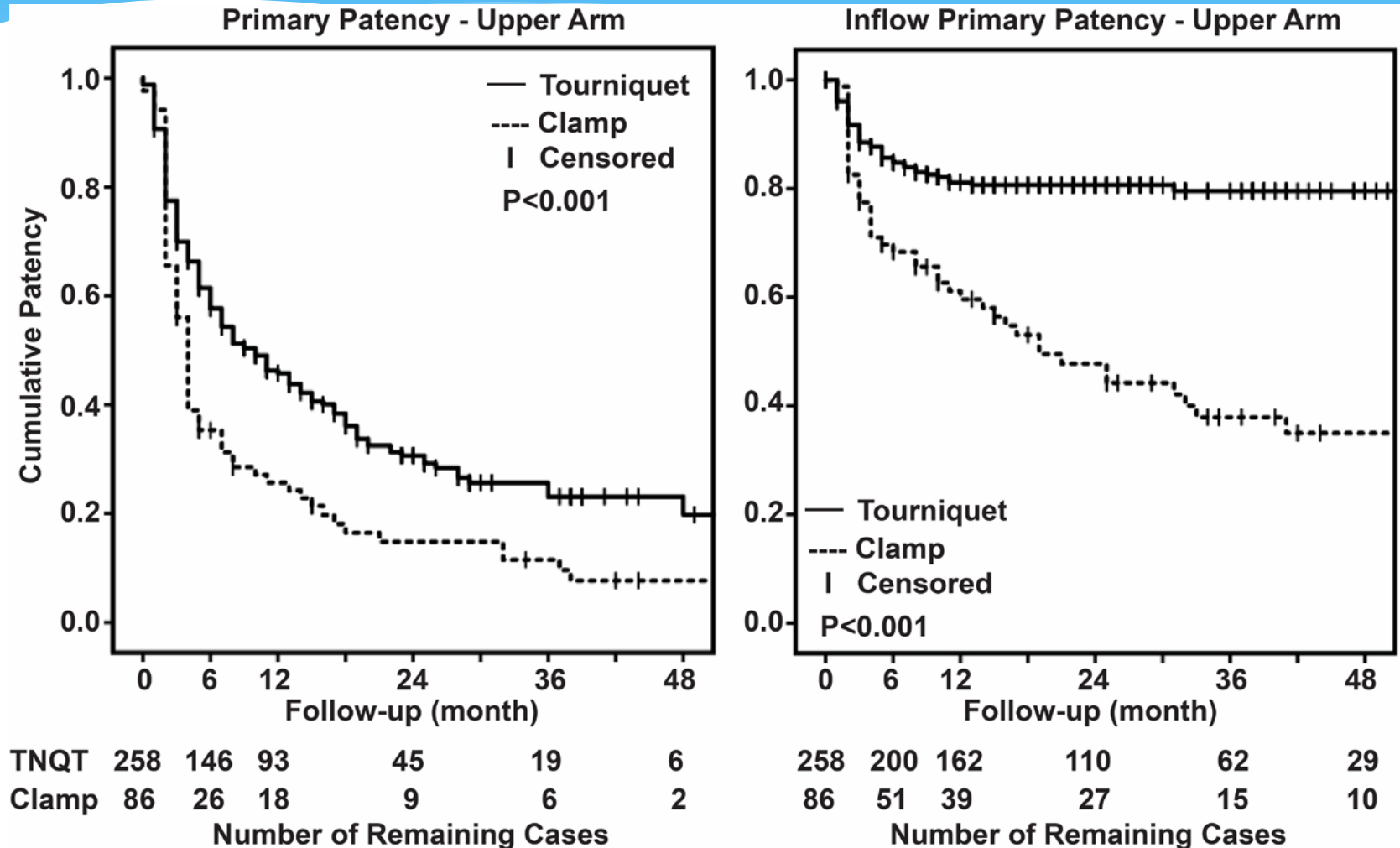


|       |                           |     |     |     |     |    |
|-------|---------------------------|-----|-----|-----|-----|----|
| TNQT  | 411                       | 317 | 319 | 221 | 140 | 77 |
| Clamp | 164                       | 144 | 131 | 106 | 83  | 66 |
|       | Number of Remaining Cases |     |     |     |     |    |

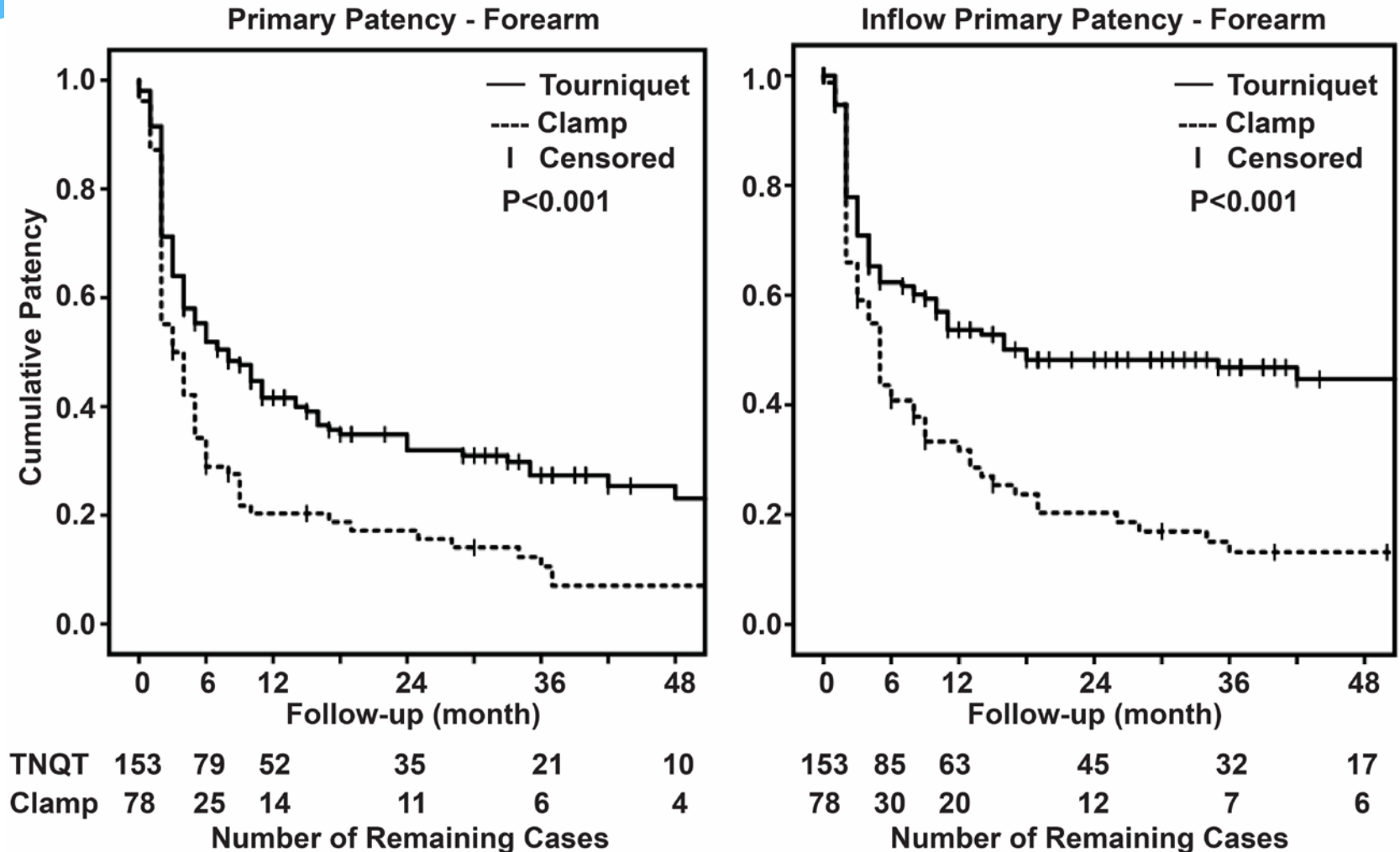


|                           |     |     |     |     |    |
|---------------------------|-----|-----|-----|-----|----|
| 411                       | 375 | 324 | 229 | 147 | 83 |
| 164                       | 145 | 133 | 112 | 88  | 70 |
| Number of Remaining Cases |     |     |     |     |    |

# Primary Patency of Upper Arm Fistulas: the Whole Circuit and the Inflow Region



# Primary Patency of Forearm Fistulas: the Whole Circuit and the Inflow Region



# Percentage of Fistulas That Required Interventions for Maturation

| * Regions of interventions | Tourniquet group | Clamp group   | P value |
|----------------------------|------------------|---------------|---------|
| *                          | (n=411 total)    | (n=164 total) |         |
| * Inflow region            | 76 (18.5%)       | 57 (34.8%)    | 0.001   |
| * Conduit segment          | 60 (14.6%)       | 53 (32.3%)    | 0.001   |
| * Outflow tract            | 12 (2.9%)        | 9 (5.5%)      | 0.145   |
| * Accessory ligation       | 15 (3.6%)        | 13 (7.9%)     | 0.051   |
| * Multiple regions         | 48 (11.7%)       | 34 (20.7%)    | 0.008   |
| * Total percentage         | 107 (26.0%)      | 78 (47.6%)    | 0.001   |

# Strength and Limitations of the Study

- \* **Strength:** single operator, inter-operator variation minimized.
- \* **Limitations:** retrospective study, non-randomized comparison, unequal sample sizes, improved surgical proficiency with time (?).

# Conclusions

- \* Intraoperative pneumatic tourniquet use may significantly improve the clinical outcomes of AVF creations by reducing trauma and stenosis of the juxta-anastomosis region.**
- \* Further data and research are needed to confirm our findings.**
- \* (All AVF creations were performed under conscious sedation and local anesthesia. Tourniquet is well tolerated under conscious sedation provided the continuous inflation time is <30 min.)**