***Supplemental Digital Content***

***Endovascular vs. Open Revascularization for Peripheral Arterial Disease***

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**Table 1S: Diagnosis and procedural codes for inclusion into cohort**

|  |  |  |
| --- | --- | --- |
| Diagnosis codes | Claudication\* | ICD-9 codes1,2:440.21 Atherosclerosis of native arteries of the extremities with intermittent claudication  |
| Critical limb ischemia | ICD-9 codes1,2:440.20 Atherosclerosis of native arteries of the extremities, unspecified 440.22 Atherosclerosis of native arteries of the extremities with rest pain 440.23 Atherosclerosis of native arteries of the extremities with ulceration440.24 Atherosclerosis of native arteries of the extremities with gangrene785.4 Gangrene 440.29 Other atherosclerosis of native arteries of the extremities 440.4 Chronic total occlusion of artery of the extremities 443.9 Unspecified peripheral vascular disease 707.10 Ulcer unspecified 707.11 Ulcer of thigh 707.12 Ulcer of calf 707.13 Ulcer of the ankle 707.14 Ulcer of heel/foot 707.15 Ulcer of foot/toes 707.19 Ulcer of other part of lower limb 730.06 Acute osteomyelitis, lower leg730.07 Acute osteomyelitis, ankle and foot730.16 Chronic osteomyelitis, lower leg730.17 Chronic osteomyelitis, ankle and foot730.26 Unspecified osteomyelitis, lower leg730.27 Unspecified osteomyelitis, ankle and foot730.36 Periostitis, without mention of osteomyelitis, lower leg730.37 Periostitis, without mention of osteomyelitis, ankle and foot730.86 Other infections involving bone in diseases classified elsewhere, lower leg730.87 Other infections involving bone in diseases classified elsewhere, ankle and foot730.96 Unspecified infection of bone, lower leg730.97 Unspecified infection of bone, ankle and foot |
| Procedural codes | Endovascular | ICD-9 codes1,2:39.50 Angioplasty of other noncoronary vessel(s)39.79 Other endo procedures of other vessels 39.90 Insertion of nondrug-eluting peripheral vessel stents(s) 00.55 Insertion of drug-eluting non-coronary stent |
| CPT codes3,4:35454 Transluminal balloon angioplasty, open; iliac35473 Transluminal balloon angioplasty, percutaneous; iliac35456 Transluminal balloon angioplasty, open; femoral-popliteal35459 Transluminal balloon angioplasty, open; tibioperoneal trunk and branches35470 Transluminal balloon angioplasty, percutaneous; tibioperoneal trunk or branches, each vessel35474 Transluminal balloon angioplasty, percutaneous; femoral-popliteal37205 Transcatheter placement of an intravascular stent(s), (except coronary, carotid, and vertebral vessel), percutaneous; initial vessel37206 Transcatheter placement of an intravascular stent(s), (except coronary, carotid, and vertebral vessel), percutaneous; each additional vessel 37207 Transcatheter placement of an intravascular stent(s), (noncoronary vessel), open; initial vessel 37208 Transcatheter placement of an intravascular stent(s), (noncoronary vessel), open; each additional vessel35482 Transluminal peripheral atherectomy, open; iliac35492 Transluminal peripheral atherectomy, percutaneous; iliac35483 Transluminal peripheral atherectomy, open; femoral-popliteal35485 Transluminal peripheral atherectomy, open; tibioperoneal trunk and branches35493 Transluminal peripheral atherectomy, percutaneous; femoral-popliteal35495 Transluminal peripheral atherectomy, percutaneous; tibioperoneal trunk and branches |
| Open | ICD-9 codes2,5:38.08 Incision of lower limb arteries 38.18 Endarterectomy of lower limb arteries 38.38 Resection of lower limb arteries with anastomosis 38.48 Resection of lower limb arteries with replacement 39.29 Other (peripheral) vascular shunt or bypass 39.56 Repair of blood vessel with tissue patch graft 39.57 Repair of blood vessel with synthetic patch graft 39.58 Repair of blood vessel with unspecified type of patch graft 39.59 Other repair of vessel  |
| CPT codes4:35563 Bypass graft, with vein; ilioiliac 35565 Bypass graft, with vein; iliofemoral 35661 Bypass graft, with other than vein; femoral-femoral 35663 Bypass graft, with other than vein; ilioiliac35665 Bypass graft, with other than vein; iliofemoral 35556 Bypass graft, with vein; femoral-popliteal 35558 Bypass graft, with vein; femoral-femoral35566 Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery 35571 Bypass graft, with vein; popliteal-tibial, -peroneal artery or other distal vessels 35583 In-situ vein bypass; femoral-popliteal 35585 In-situ vein bypass; femoral-anterior tibial, posterior tibial, or peroneal artery 35587 In-situ vein bypass; popliteal-tibial, peroneal 35656 Bypass graft, with other than vein; femoral-popliteal 35666 Bypass graft, with other than vein; femoral-anterior tibial, posterior tibial, or peroneal artery 35671 Bypass graft, with other than vein; popliteal-tibial or -peroneal artery 35879 Revision, lower extremity arterial bypass, without thrombectomy, open; with vein patch angioplasty35881 Revision, lower extremity arterial bypass, without thrombectomy, open; with segmental vein interposition 35883 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with nonautogenous patch graft35884 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with autogenous vein patch graft 35541 Bypass graft, with vein35681 Bypass graft; composite, prosthetic and vein 35682 Bypass graft; autogenous composite, two segments of veins from two locations 35683 Bypass graft; autogenous composite, three or more segments of vein35351 Thromboendarterectomy, including patch graft, if performed; iliac 35355 Thromboendarterectomy, including patch graft, if performed; iliofemoral35302 Thromboendarterectomy, including patch graft, if performed; superficial femoral artery35303 Thromboendarterectomy, including patch graft, if performed; popliteal artery 35304 Thromboendarterectomy, including patch graft, if performed; tibioperoneal trunk artery35305 Thromboendarterectomy, including patch graft, if performed; tibial or peroneal artery 35306 Thromboendarterectomy, including patch graft, if performed; each additional tibial 35371 Thromboendarterectomy, including patch graft, if performed; common femoral 35372 Thromboendarterectomy, including patch graft, if performed; deep (profunda) femoral |

\*Patients were classified as having claudication, and not critical limb ischemia, if they had a ICD-9 diagnosis code of 440.21 without co-diagnosis of rest pain, osteomyelitis, ulceration, and/or gangrene.

**Table 2S: Subsequent intervention procedural codes**

|  |  |  |  |
| --- | --- | --- | --- |
| All additional interventions | Endovascular reinterventions | Angioplasty | ICD-9 codes1: 39.50 Angioplasty of other noncoronary vessel(s) |
| CPT codes3:35454 Transluminal balloon angioplasty, open; iliac35473 Transluminal balloon angioplasty, percutaneous; iliac35456 Transluminal balloon angioplasty, open; femoral-popliteal35459 Transluminal balloon angioplasty, open; tibioperoneal trunk and branches35470 Transluminal balloon angioplasty, percutaneous; tibioperoneal trunk or branches, each vessel35474 Transluminal balloon angioplasty, percutaneous; femoral-popliteal |
| Thrombolysis | CPT codes6:37201 Cardiovascular Transcatheter therapy, infusion for thrombolysis other than coronary. 37202 Cardiovascular Transcatheter therapy, infusion other than for thrombolysis, any type (eg, spasmolytic, vasoconstrictive).  |
| Intravascular Stent | ICD-9 codes1,239.90 Insertion of nondrug-eluting peripheral vessel stents(s) 00.55 Insertion of drug-eluting non-coronary stent |
| CPT codes4:37205 Transcatheter placement of an intravascular stent(s), (except coronary, carotid, and vertebral vessel), percutaneous; initial vessel37206 Transcatheter placement of an intravascular stent(s), (except coronary, carotid, and vertebral vessel), percutaneous; each additional vessel 37207 Transcatheter placement of an intravascular stent(s), (noncoronary vessel), open; initial vessel 37208 Transcatheter placement of an intravascular stent(s), (noncoronary vessel), open; each additional vessel |
| Arthrectomy | CPT codes4:35482 Transluminal peripheral atherectomy, open; iliac35492 Transluminal peripheral atherectomy, percutaneous; iliac35483 Transluminal peripheral atherectomy, open; femoral-popliteal35485 Transluminal peripheral atherectomy, open; tibioperoneal trunk and branches35493 Transluminal peripheral atherectomy, percutaneous; femoral-popliteal35495 Transluminal peripheral atherectomy, percutaneous; tibioperoneal trunk and branches |
| Angiogram | CPT codes6:36140 Cardiovascular Introduction of needle or intracatheter; extremity artery. 36200 Cardiovascular Introduction of catheter, aorta36245 Cardiovascular Selective catheter placement, arterial system; each first order abdominal, pelvic, or lower extremity artery branch, within a vascular family.36246 Cardiovascular Selective catheter placement, arterial system; initial second order abdominal, pelvic, or lower extremity artery branch, within a vascular family. 36247 Cardiovascular Selective catheter placement, arterial system; initial third order or more selective abdominal, pelvic, or lower extremity artery branch, within a vascular family. 36248 Cardiovascular Selective catheter placement, arterial system; additional second order, third order, and beyond, abdominal, pelvic, or lower extremity artery branch, within a vascular family.75626 Angiogram75630 Aortography, abdominal plus bilateral iliofemoral lower extremity, catheter, by serialography, radiological supervision and interpretation. |
| Open reinterventions | Thrombectomy/ Embolectomy | CPT codes4:37184 Thrombectomy - Prim art mech thrombectomy37185 Thrombectomy - Prim art mech thrombectomy add on34203 Embolectomy – removal of leg artery clot35351 Thromboendarterectomy, including patch graft, if performed; iliac 35355 Thromboendarterectomy, including patch graft, if performed; iliofemoral35302 Thromboendarterectomy, including patch graft, if performed; superficial femoral artery35303 Thromboendarterectomy, including patch graft, if performed; popliteal artery 35304 Thromboendarterectomy, including patch graft, if performed; tibioperoneal trunk artery35305 Thromboendarterectomy, including patch graft, if performed; tibial or peroneal artery 35306 Thromboendarterectomy, including patch graft, if performed; each additional tibial 35371 Thromboendarterectomy, including patch graft, if performed; common femoral 35372 Thromboendarterectomy, including patch graft, if performed; deep (profunda) femoral |
| Open bypass graft or repair | ICD-9 codes2,5:38.08 Incision of lower limb arteries 38.18 Endarterectomy of lower limb arteries 38.38 Resection of lower limb arteries with anastomosis 38.48 Resection of lower limb arteries with replacement 39.29 Other (peripheral) vascular shunt or bypass 39.56 Repair of blood vessel with tissue patch graft 39.57 Repair of blood vessel with synthetic patch graft 39.58 Repair of blood vessel with unspecified type of patch graft 39.59 Other repair of vessel  |
| CPT codes4:35563 Bypass graft, with vein; ilioiliac 35565 Bypass graft, with vein; iliofemoral 35661 Bypass graft, with other than vein; femoral-femoral 35663 Bypass graft, with other than vein; ilioiliac35665 Bypass graft, with other than vein; iliofemoral 35556 Bypass graft, with vein; femoral-popliteal 35558 Bypass graft, with vein; femoral-femoral35566 Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery 35571 Bypass graft, with vein; popliteal-tibial, -peroneal artery or other distal vessels 35583 In-situ vein bypass; femoral-popliteal 35585 In-situ vein bypass; femoral-anterior tibial, posterior tibial, or peroneal artery 35587 In-situ vein bypass; popliteal-tibial, peroneal 35656 Bypass graft, with other than vein; femoral-popliteal 35666 Bypass graft, with other than vein; femoral-anterior tibial, posterior tibial, or peroneal artery 35671 Bypass graft, with other than vein; popliteal-tibial or -peroneal artery 35879 Revision, lower extremity arterial bypass, without thrombectomy, open; with vein patch angioplasty35881 Revision, lower extremity arterial bypass, without thrombectomy, open; with segmental vein interposition 35883 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with nonautogenous patch graft35884 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with autogenous vein patch graft 35541 Bypass graft, with vein35681 Bypass graft; composite, prosthetic and vein 35682 Bypass graft; autogenous composite, two segments of veins from two locations  |

**Table 3S: Subsequent interventions after endovascular and open lower extremity revascularization for matched groups\***

|  |  |  |
| --- | --- | --- |
|  |  | *Subsequent Interventions, % (95% Confidence Interval)* |
| *Time* | *Index Procedure* | *Any* | *Endovascular* | *Open* |
| *30-days* | Endovascular | 14.6 | 13.5 | 2.1 |
| Open | 7.2 | 4.1 | 4.4 |
| **Difference** | **+7.4 (6.3,8.5)** | **+9.4 (8.4,10.4)** | **-2.3 (-2.9,1.7)** |
| *Year 1* | Endovascular | 38.3 | 35.8 | 7.3 |
| Open | 30.7 | 24.1 | 14.8 |
| **Difference** | **+7.6 (5.7,9.5)** | **+11.7 (9.9,13.5)** | **-7.5 (-8.8,-6.2)** |
| *Year 2* | Endovascular | 45.3 | 42.9 | 9.2 |
| Open | 38.3 | 31.8 | 18.1 |
| **Difference** | **+7.0 (4.9,9.1)** | **+11.1 (9.0,13.2)** | **-8.9 (-10.3,-7.4)** |
| *Year 3* | Endovascular | 50.0 | 47.9 | 10.4 |
| Open | 43.7 | 37.4 | 20.9 |
| **Difference** | **+6.3 (3.9,8.7)** | **+10.5 (8.0,13.0)** | **-10.5 (-12.2,-8.8)** |
| *Year 4* | Endovascular | 54.0 | 51.8 | 10.8 |
| Open | 45.4 | 39.1 | 21.7 |
| **Difference** | **+8.6 (5.5,11.7)** | **+12.7 (9.6,15.8)** | **-10.9 (-12.8,-9.0)** |
| *P-value* |  | <0.001 | <0.001 | <0.001 |

\*Data are hierarchical (e.g., a given patient may have undergone and been counted for both a subsequent endovascular intervention and a subsequent open intervention but would have been counted only once for any subsequent intervention); P-values were obtained with the use of log-rank analysis of Kaplan-Meier curves testing the overall difference in event rates between index procedure groups. Rates are cumulative over time.

*Difference,* relative rate difference of endovascular vs. open

**Table 4S: Adjusted hazard ratios and 95% confidence intervals for overall 4-year amputation or death, endovascular vs. open revascularization, controlling for patient demographics, preoperative characteristics, and perioperative factors**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Hazard Ratio | 95% CI | P-value |
| Unadjusted | 0.87 | 0.82-0.91 | <0.001 |
| Adjusted for covariates\* | 0.84 | 0.79-0.88 | <0.001  |
| Adjusted for covariates\* with SMR weighting estimation | 0.84 | 0.80-0.88 | <0.001 |
| Adjusted for covariates\* with propensity score matching (1 to 1, nearest neighbor, caliper = 0.02) | 0.84 | 0.79-0.89 | <0.001 |
| Adjusted for covariates\* with propensity score stratification by quintiles | 0.83 | 0.73-0.94 | 0.044 |

\*Cox regression model controlling for age, gender, extent of disease, diabetes, renal failure, congestive heart failure/ ischemic heart disease, myocardial infarction, stroke, electrolyte disorder, deficiency anemia, coagulopathy, chronic pulmonary disorder, neurological disorder, dementia, pulmonary circulation disorder, weight loss, cancer, race, eye disease, chronic blood loss anemia, rheumatoid arthritis or collagen vascular disease, complicated hypertension, obesity, benign tumor, Medicaid eligibility ever, hospital and patient rural urban commuting area, hospital type, origin of admission and year of procedure.

*CI*, confidence interval; *SMR*, standardized mortality ratio

**Table 5S: Adjusted hazard ratios and 95% confidence intervals for overall 4-year amputation or death, endovascular vs. open revascularization, by controlling for patient demographics, preoperative characteristics, and perioperative factors, stratified by propensity score quintiles**

|  |  |  |  |
| --- | --- | --- | --- |
| Quintile | Hazard Ratio | 95% CI | P-value |
| 1 | 0.85 | 0.73-0.99 | 0.044 |
| 2 | 0.87 | 0.76-0.99 | 0.033 |
| 3 | 0.86 | 0.77-0.98 | 0.018 |
| 4 | 0.81 | 0.72-0.91 | <0.001 |
| 5 | 0.79 | 0.70-0.88 | <0.001 |

Each respective Cox regression model controlling for age, gender, extent of disease, diabetes, renal failure, congestive heart failure/ ischemic heart disease, myocardial infarction, stroke, electrolyte disorder, deficiency anemia, coagulopathy, chronic pulmonary disorder, neurological disorder, dementia, pulmonary circulation disorder, weight loss, cancer, race, eye disease, chronic blood loss anemia, rheumatoid arthritis or collagen vascular disease, complicated hypertension, obesity, benign tumor, Medicaid eligibility ever, hospital and patient rural urban commuting area, hospital type, origin of admission and year of procedure.

*CI*, confidence interval

**A.** AFS by procedure type and presence of DM **B.** AFS by procedure type and presence of RF

 

**C.** AFS by procedure type and presence of CHF/IHD **D.** AFS by procedure type and presence of CLI

 

**Figure 1S.** **Overall 4-year amputation free survival by endovascular vs. open revascularization and comorbidity in propensity score matched cohorts. A**, 4-year amputation free survival by procedure type and presence of diabetes mellitus; **B**, 4-year amputation free survival by procedure type and presence of renal failure; **C,** 4-year amputation free survival by procedure type and presence of congestive heart failure/ischemic heart disease; **D,** 4-year amputation free survival by procedure type and extent of disease.

*AFS*, amputation free survival; *RF*, renal failure; *DM*, diabetes mellitus; *CLI*, critical limb ischemia, *CHF/IHD*, congestive heart failure / ischemic heart disease, *Endo,* endovascular.

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