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INSIDE

NOVEMBER 1998

VOL. 3, NO. 11 (pages 133-144)

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Radial access for stents: Fewer complications, shortened LOS

LOS reduced 4.5 days to 3; charges lowered by 15%

More and more of your colleagues are using radial instead of femoral access as an entry site for cardiovascular stenting. A new study conducted by cardiologists in Raleigh, NC, concludes that wrist artery access leads to fewer access site bleeding complications, earlier ambulation, shorter hospital stays, and lower costs than traditional groin artery access.[1] The Raleigh investigators found total hospital stay reduced from 4.5 days for patients accessed through the femoral artery to three days in the radial group. Hospital charges were lowered in the radial group by 15%. **(See *Cost Management in Cardiac Care*, February 1997, p. 13, for a story on the group's preliminary findings.)**

Traditionally, interventional cardiologists puncture a hole in the groin to gain access to the femoral artery for angioplasty and stent placement. Following the femoral procedure, the puncture site is subject to bleeding complications. Patients have to remain in a supine position, and that leads to back pain and difficulty voiding. Bleeding complications are especially likely in patients who have acute coronary syndromes because they typically receive high levels of anticoagulants and blood thinners.

By contrast, because of its size and position, the radial artery in the wrist is less prone to bleeding complications. "Patients love it because they can get up and walk much earlier than before," says lead study author **Tift Mann**, MD, of the Wake Heart Center in Raleigh. The research

KEY POINTS

- Radial access: faster recovery and happier patients.
- Placing stents via the wrist rather than the groin is proving advantageous for cardiologists and patients alike.
- Decreased complications lead to fewer hospital days and lower costs.
- Not all patients are candidates for radial access one prerequisite is absence of an anatomical anomaly.

More complications after stenting for the elderly

Many elders can expect long-term survival

Elderly patients who undergo coronary artery stenting have significantly more pre- and postoperative complications than younger patients, but overall survival rates in the elderly remain high, according to recent research.[1] Investigators compared 137 stenting patients who were at least 75 years old with about 2,500 patients under 75.

The elderly group had relatively more complications during surgery, including bleeding and stroke, than did the younger group. The elderly group also had more complications going into surgery, such as complex lesions, unstable angina, and multivessel disease.

But after a 12-month follow-up, overall survival was 91% in the elderly group, and of those, 54% did not suffer postoperative complications. Most elderly patients who died after stent placement did so within a month, suggesting that "if an elderly patient survived this critical period, he could expect long-term survival," the authors conclude.

Reference

1. De Gregorio J, Kobayashi Y, Albiero R, et al. Coronary artery stenting in the elderly: Short-term outcome and long-term angiographic and clinical follow-up. *J Am Coll Cardiol* 1998; 32:577-583. ■

team randomized 142 patients who were receiving a stent for an acute coronary syndrome to have their procedure performed from either the femoral or the radial access site. Stents were successfully implanted in 96% of the patients in each group. Bleeding complications at the access site occurred in three patients in the femoral group compared with no patients in the radial group. All patients received 325 mg aspirin prior to the procedure. Heparin, 5,000 units, was administered during catheterization, and additional heparin was given on a weight-adjusted basis prior to the interventional procedure. Abciximab was administered during the procedure. **(See related article on abciximab, p. 136.)** All patients received ticlopidine, 500 mg, at completion followed by 250 mg for two to four weeks.

Jerri DeVaney, RN, BSN, care manager of the cardiac service line at St. Francis Hospital and Health Centers in Beech Grove, IN**,** says her department started doing radial access almost a year ago and have performed the surgery on 50 patients with no complications thus far. "It relieves the patient of the necessity to lie flat and allows more mobility and comfort," she says.

The superficial location of the radial artery allows easy hemostasis. The radial artery sheath is removed immediately at completion of the procedure. The St. Francis team uses a compressive dressing at the catheter insertion site on the wrist for about an hour so patients can sit up and eat. The bandage is removed gradually to assure bleeding has stopped. Soon, patients can resume normal activities. "Patients are happier with radial access," DeVaney says. "When we go in through the groin, their backs hurt and they can't turn."

Edward Oruci, MD, an interventional cardiologist at Long Island Interventional Cardiology in Roslyn, NY, points out that elderly men have difficulty urinating while lying on their backs. "A Foley catheter often has to be placed, and that can be traumatic. So being able to get up quickly is important."

"Most of our radial access patients go home the same day," says DeVaney, "and that saves a whole day's hospitalization charges." Radial access patients at St. Francis go to a step-down unit or the cardiac procedures recovery unit — the facility's short stay observation area — instead of a coronary care unit (CCU), so use of those resources are decreased too. Within about two hours, the patient is fairly mobile; using groin access, patients are flat on their backs for four to six hours in the CCU.

David McRoberts, RN, director of the catheterization lab at St. Francis says an important advantage of radial access is that the procedure allows

COMING IN FUTURE MONTHS

- Beta blockade effects 40% fewer deaths: Even contraindicated patients benefit
- Lepirudin may prevent heart attacks, death: Stabilizing may be option to early cath and angioplasty
- Determining stroke risk with PET: Is carotid occlusion an independent predictor?
- Grafted muscle cells aid damaged hearts: They respond after transplant
- New study shows that bypasses and angioplasties are equally safe for men and women

easier and more cost-efficient post-op care. "Patients would be able to walk off the table if it were not for the conscious sedation. We go in through a small puncture at the radial artery. Once the catheter is engaged, everything else is done as you would if you went in through the groin."

Oruci says he has done radial access safely and successfully more than 100 times. In his words, "It's feasible and appropriate." The femoral approach is associated with complications such as blood clots, the need for blood transfusion, surgical repair of vascular problems, and lingering pain that limits mobility. All those problems are preempted by the radial approach. "The patient is allowed to get up out of bed quickly, back on his feet, without complications," he says.

New systems shorten learning curve

Because the radial artery is smaller than the femoral artery, the radial access technique makes use of a miniature catheter system. Procedure time and cost of operating room time are equivalent to the traditional methods of angioplasty and stent placement. The significant economic benefit to hospitals involves a shorter length of stay and the need for fewer diagnostic and therapeutic procedures for stent-related bleeding complications.[2-4]

"Not only can patients leave the hospital sooner," Oruci says, "radial access lessens their anxiety state. It seems to make them more at ease when they see how easy it is for us to enter the heart from the arm. And that seems to motivate them to begin taking care of themselves."

Patients are kept overnight after the radial access procedure just as after the standard femoral approach at Oruci's hospital. "But none so far has had to spend more than that one night," he says.

There's a class of patients who should not be approached with radial access, he warns. They are among a small percentage — 5% of the population — with only one artery supplying the hand. About 95% of the population has one artery on the radial side and one on the ulnar side of the wrist offering a dual blood supply to the hand. Prospective patients are screened to determine the adequacy of blood flow. "You wouldn't want to jeopardize that single blood supply to the hand," he says, "because while you work in the radial artery, blood flow into the hand is temporarily stopped."

Until recently, stent size had to be considered when planning radial access, says Oruci, but because of new stents approved by the Food and Drug Administration, "we now have available a large selection that we can access through the smaller sheath size that we use for the radial approach." **(See photo of stents, above, courtesy of Cook Cardiology in Bloomington, IN.)**

Stenting from the radial approach involves a significant learning curve, but that should be shorter with the newer delivery systems. **(See article, above, on a system recently withdrawn from the market.)**

Radial access can be employed as well for methods of clearing blockages, such as the rotablator technique which uses a diamond-tipped catheter to drill away plaque.

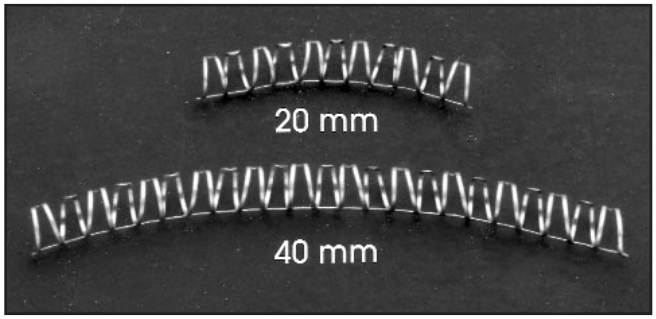
FDA issues warning on stenting system

NIR ON Ranger with Sox system recalled

In October, the Food and Drug Administration warned hospitals to immediately stop using a new system that implants heart stents after reports that 22 patients were injured and one died. The "NIR ON Ranger with Sox" coronary stent delivery system manufactured by Boston Scientific of Natick, MA, was voluntarily recalled after about 36,000 of the devices were shipped.

The 22 reports included four cases requiring surgical intervention and three incomplete stent deployments or stent migrations. The remainder constituted events that were resolved within the cardiac cath lab.

The device had been popular because the Sox feature — little wings covering the stent's edges — made it easy to position properly. Boston Scientific reported more than 100 cases of balloon leakage during surgery. Balloon leakage causes the stent to float through the bloodstream, clogging narrow arteries or cutting blood vessel walls. If the partially opened stent can't be quickly removed, patients may need surgery to retrieve it. The company stated that it has received reports of balloon leaks at a rate of about five per 1,000, with a procedural complication rate of about one per 1,000. ■



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2. Kiemeneiu F, Laarman GH, Odekerken D, et al. A randomized comparison of percutaneous transluminal coronary angioplasty by radial, brachial, and femoral approaches. *J Am Coll Cardiol* 1997; 29:1,269-1,275.

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4. Cohen D. Outpatient transradial coronary stenting: Implications for cost-effectiveness. *J Invas Cardiol* 1996; 8(Suppl D):36-39. ■

Experience = better outcomes

A recent study shows that physicians with more experience implanting stents have better results than those with less.[1] It had been shown that more experience performing balloon angioplasty resulted in more successful procedures, but some experts believed operator experience would not play as important a role in stents.

Adnan Kastrati, MD, et al. analyzed data from 3,409 consecutive patients with a stent implanted by one of 10 physicians at a single hospital in Munich, Germany. After adjusting for differences in baseline risk factors, the rate of adverse events was 1.7% for patients treated by physicians who performed the procedure often vs. 4.69% for those who performed the procedure less often. "An experience of at least 100 procedures and an annual volume of at least 70 procedures are required to ensure a significantly better outcome after coronary stent implantation," states the conclusion.

The findings suggest that current American College of Cardiology/American Heart Association guidelines for balloon angioplasty, which recommend that physicians perform at least 75 procedures each year to maintain competency, are probably valid for stent procedures as well.

The German researchers also found that low-volume operators could successfully treat patients at low risk for complications. "We now have data that illustrate that we can match the operator's experience with the risk of each patient," writes Kastrati. However, he emphasizes, "Even for operators treating very low-risk patients, a minimum number of procedures is necessary."

Reference

1. Kastrati A, Neumann F, Schomig A. Operator volume and outcome of patients undergoing coronary stent placement. *J Am Coll Cardiol* 1998; 32:970-976. ■

ReoPro shown to reduce post-stent AMIs

Drug boosts safety of stenting and angioplasty

Researchers have shown that use of abciximab (Malvern, PA-based Centocor's ReoPro) substantially improves the safety of coronary stenting procedures and that balloon angioplasty with abciximab is safer than stenting without the agent.[1] The study authors state that their trial provides strong evidence that the armamentarium of heparin, aspirin, and ticlopidine is insufficient and that a decrease of more than 50% in major events can be achieved with abciximab. The agent, they say, represents "a new standard of care for prevention of major adverse ischemic outcomes." Although the agent costs approximately $1,500 per dose, those are "strong words to show your hospital administrator," states **Michael H. Crawford**, MD, chief of cardiology at the University of New Mexico in Albuquerque.

Inhibition of the platelet glycoprotein-IIb / IIIa receptor (IIb / IIIa) for reduced clotting had been shown to improve revascularization when used in combination with balloon angioplasty. Investigators for the largest coronary stent trial to date, the EPISTENT (Evaluation of IIb / IIIa Platelet Inhibitor for Stenting) study, wanted to find out whether a IIb / IIIa inhibitor would be beneficial when combined with stenting.

At 63 hospitals in the United States and Canada, more than 2,000 patients with heart disease were randomly assigned to three groups: stenting plus placebo, stenting plus the drug abciximab, or balloon angioplasty plus abciximab. All patients received aspirin and heparin. The researchers wanted to find out how these different methods affected the likelihood of death, nonfatal acute myocardial infarctions (AMI), or the need for urgent revascularization in the first 30 days after treatment.

There were fewer deaths and AMIs in the stent group receiving abciximab than in the group that did not. Of the patients who received stenting plus placebo, nearly 11% died, had a nonfatal AMI, or needed urgent revascularization. The result was the same for only about 7% of the patients given balloon angioplasty plus abciximab and only 5.3% of those assigned stenting plus abciximab.

Both death and major AMI occurred less with the use of abciximab — 7.8% in the placebo group,

Stent costs decrease without warfarin

Investigators have found an overall decline in costs of stent cases when warfarin anticoagulation is abandoned.[1] As stenting practice has evolved, concern has focused on the increasing delivery costs. To evaluate changes, researchers examined total costs; costs for catheterization, laboratory equipment, and equipment use; and non-laboratory hospital costs for stents in two time periods, one involving routine warfarin anticoagulation and one in which warfarin was not used.

❑ Overall costs dropped from the first period ($11,293 ± $7672) to the second ($9,819 ± $3,636).

❑ Cath lab equipment expenditures rose from the first period ($3,823 ± $1,394) to the second ($4,278 ± $1,533).

❑ Non-cath-lab hospital costs declined from the first period — $7,281 ± $7,179 — to the second — $5,560 ± $3,420.

The difference was most notable when considering the deletion of warfarin anticoagulation. Costs declined by $2,428 for patients in the period in which warfarin was not prescribed. The researchers conclude that, despite increasing costs of equipment, the overall cost of providing stents declined as warfarin anticoagulation was abandoned.

Reference

1. Vaitkus PT, Adele C, Wells SK, et al. The evolving costs of intracoronary stents. *Am Heart J* 1998; 136:132-135. ■

4.7% for balloon angioplasty plus abciximab, and 3% for stenting plus abciximab. Researchers concluded that use of abciximab substantially improved the safety of stenting procedures and that balloon angioplasty with abciximab is safer than stenting without abciximab.

One difficulty for all types of catheter-based revascularization strategies has been the need for repeat revascularization procedures in the target vessel within six months. The endpoint of death, AMI, or urgent target vessel revascularization within six months was significantly reduced from more than 18% in the placebo and stent group to 13.0% in the abciximab and stent group.

Among diabetics, who tend to have worse outcomes after coronary revascularization procedures, the composite endpoint of death, AMI, or target vessel revascularization was reduced by half, suggesting the combined use of abciximab and stents can substantially mitigate the higher risk and poorer long-term outcomes of coronary interventions in diabetics — a major step in the treatment of ischemic heart disease in this population.

The most common side effect of abciximab is bleeding. However, the EPISTENT study showed that bleeding events can be reduced to a level similar to placebo by using low-dose, weight-adjusted heparin regimens, early sheath removal, and meticulous care of the site of catheter insertion.

Reference

1. The EPISTENT Investigators. Randomized placebo-controlled and balloon-angioplasty-controlled trial to assess safety of coronary stenting with use of platelet glycoprotein-IIb / IIIa blockade. *Lancet* 1998;352:87-92. ■

Laparoscopic vein harvest gains favor

Teams save on comps from CABG vein harvesting

For more than a year now, the vein harvesting team at Jewish Hospital in Cincinnati has been doing its work laparoscopically, and the technique has been getting good, cost-effective results. The video procedure eliminates the long leg incision — sometimes 40 cm or more — required to harvest the saphenous vein for use in coronary artery bypass surgery (CABG) and reduces postoperative pain and recovery time. Leg complications, including blood clots, fluid build-up, and drainage, are less for patients who undergo the endoscopic procedure, as are the number of follow-up office visits required for leg care.

"Patients used to complain bitterly about leg pain after vein harvesting," says **Michael Bowen**, PA, RN, administrative director of the department of surgery at Jewish Hospital. "Since we began using the scope, patients recover well and don't hurt as much."

"Much of the pain associated with CABG is actually caused by the leg incision, not the sternotomy," explains **Lynn B. McGrath**, MD, chief of cardiothoracic surgery at Deborah Heart and Lung Center located in Browns Mills, NJ. Deborah also offers patients videoscopic saphenous vein harvesting.

In the videoscopic procedure, the surgeon makes two or three two-inch incisions in the leg

KEY POINTS

- Minimally invasive leg vein harvesting for CABG surgery is less painful and causes fewer systemic morbidities and complications.
- Much of the pain associated with CABG is caused by the leg incision, not the sternotomy.
- The laparoscopic technique is cost-effective over the long haul and gets high marks in patient satisfaction.
- it doesn't increase overall surgery time.

for insertion of a small, narrow scope. The veins are drawn through the openings.

"The cost of the laparoscopic equipment depends on the manufacturer, but disposable kits we use run anywhere from $350 to $550," says **Gary Sheldon**, perioperative specialist in the surgery department at Jewish Hospital. "No additional operating room time is involved, so that cost stays the same." Vein harvest times are somewhat longer for the endoscopic procedure, but closure times are less because of the small incision, resulting in no time difference for the total procedure.

The scope alone represents a capital outlay of about $3,500, but the device, light sources, and other related equipment may already be at your hospital, as they are at Sheldon's, because they are used in other areas of the facility for arthroscopies and gynecologic procedures.

"It's difficult to quantify cost," says Bowen, "but you have to take into consideration the fact that when you do minimally invasive surgery on the leg, you avoid infection, so that potential extended hospitalization is avoided."

Laparoscopic harvesting is reimbursable, just like traditional methods. "The disposable trocars and other equipment are more expensive than traditional tools," says Bowen, "but those costs are passed on and reimbursed."

When looking at the cost-effectiveness of this procedure vs. that of the traditional harvest, you have to first consider the cost of the supplies. One company that manufactures a basic disposable kit is Guidant Corporation of Menlo Park, CA. Its VasoView kit costs $550-650 and includes:

- ❒ balloon dissection cannula;
- ❒ Uniport cannula;
- ❒ 12-mm blunt-tip trocar;
- ❒ bipolar scissors;
- ❒ bisector;
- ❒ syringe.

When using the VasoView system, your capital outlay for equipment includes about $3,200 for a 5 mm extended length endoscope, which is specific to the system, and a video cart that holds the camera head, monitor, and light source.

On the plus side is a reduction in supply use. The traditional vein harvesting procedure requires about six packages of sutures at $22 per package. The endoscopic procedure calls for just one pack, saving $110. Four packs of lap sponges are required for the traditional procedure at $15 a pack. Add to those expenses the cost of clips, dressings, and other supplies, and **Nina Fernandes** of Guidant estimates overall savings are $300-350 per procedure. "Over a year, you're probably going to come out with a break-even proposition."

Endoscopic harvesting has a fairly long learning curve — it can take 25 to 35 procedures for a surgeon to get comfortable with the procedure, according to Fernandes. ■

Patients prefer endoscopic harvest

Studies show less pain, less scarring

Researchers in a study led by **Marc Gerdisch**, MD, a cardiovascular surgeon on the staff of Central DuPage Hospital in Winfield, IL, found that patients who undergo endoscopic harvesting report significantly less pain than as patients treated with more traditional techniques.[1] "We found that patients were very satisfied with their outcomes, not only because of the lack of leg pain, but for cosmetic reasons as well," Gerdisch writes. "They are able to resume full activity sooner and, without leg scars, there is little evidence they have undergone major surgery."

Data from 394 patients undergoing endoscopic harvesting were compared to that of 191 traditional patients. Closure times were significantly reduced in the endoscopic group although total skin-to-skin operating times for the entire procedure did not differ. Leg infection rates and other morbidities were lower, hospital readmissions for leg wound care were low, office visits required for leg care were lower, and pain perception was less.

A previous study by the researchers involved 209 heart bypass patients — 110 who had the endoscopic vein harvesting procedure and 99 who underwent the traditional open leg procedure.[2] That study also concluded that the technique is

safe, effective, and less painful.

More than 70% of all the patients who undergo CABG can be candidates for endoscopic harvesting. But, says **Michael Bowen**, PA, RN, administrative director of the department of surgery at Jewish Hospital in Cincinnati, the procedure is especially suited for patients who are debilitated. "It's the surgeon's preference of course, but diabetics are ideal candidates," he explains. "Since their tissue doesn't heal well, the smaller the incisions, the faster they'll heal and with fewer complications."

The harvesting is done toward the beginning of the cardiac grafting procedure. "By the time the surgeon is ready to perform the anastomosis of vessels, the vein has to be ready for use," he says.

Although veins typically are taken from patients' legs for use in heart bypass surgery, Jewish Hospital has tried harvesting radial arteries from patients' arms instead and found that the implanted artery stays open longer than a vein from the leg. "Patients seem to feel less post-op discomfort in their arms than in legs probably because legs are weight-bearing," says Bowen.

References

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2. Davis Z, Jacobs H, Zhang M, et al. Endoscopic vein harvest for coronary artery bypass grafting: Technique and outcomes. *J Thorac Cardiovasc Surg* 1998; 116:228-235. ■

New devices cut LOS and costly complications

Rapid, atraumatic endoscopic harvesting of the saphenous vein for use in coronary artery bypass surgery is gaining favor among your colleagues. The procedure results in improved clinical outcomes: fewer wound complications, fewer readmissions, and decreased need for office follow-up than the traditional open method. **(See charts, p. 140, courtesy of Marc Gerdish, MD, Cardiac Surgery Associates, Central Dupage Hospital, Winfield, IL.)** Donor site infections can add $8,500 on average to the cost of hospitalization for cardiac surgery.[1] Length of stay can double due to wound complications, adding upward of $9,900.[2]

Early data from a clinical study comparing endoscopic to traditional harvesting shows that the newer technique significantly reduces pain and leads to earlier and improved ambulation.[3] Also, vein quality was judged to be good in a clinical study comparing the procedures.[4] Each showed preserved intimal structure. The VasoView Uniport (Guidant, Indianapolis), was introduced in August. The device requires only a single, 2 cm incision, allowing for a quicker procedure, fewer complications, less pain, accelerated ambulation, and improved cosmetics. **(See photos, at right and on p. 140, courtesy of Marc Gerdish, MD.)**

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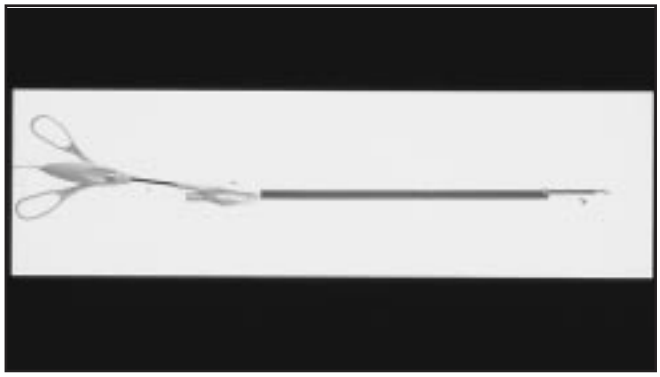
2. DeLaria GA, et al. Leg wound complications associated with coronary revascularization. *J Thorac Cardiovasc Surg* 1981; 81:403-407.

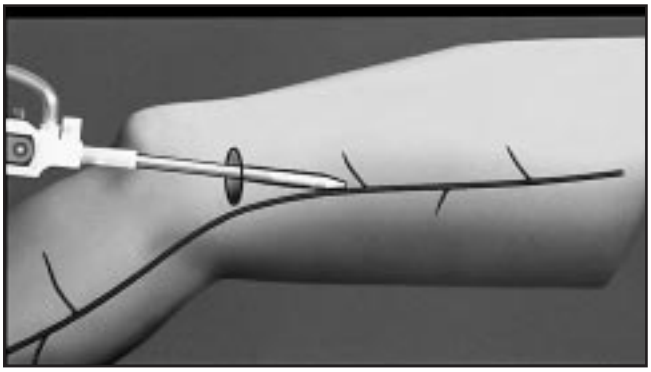
3. Morris R. Facts and myths of minimally invasive cardiac surgery. Seminar presented at Current Trends in Thoracic Surgery IV, January 1998.

4. Chin A, et al. Endoscopic cardiovascular vessel harvesting. 6th World Congress of Endoscopic Surgery. Oral communication, posters, and videos. June 1998; 875-879. ■

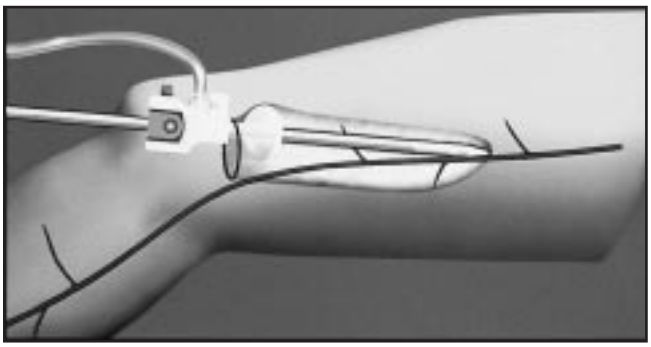
VasoView balloon dissection cannula tips.



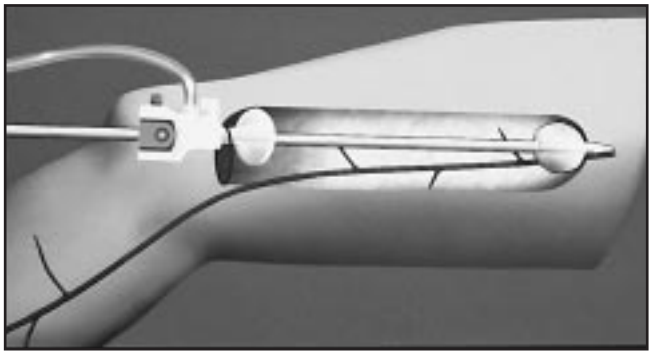
VasoView balloon dissection cannula tips.



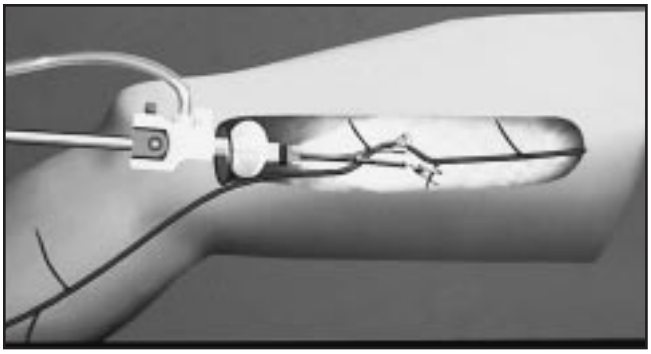
Making the incision: Insert cannula into incision and visualize on monitor.



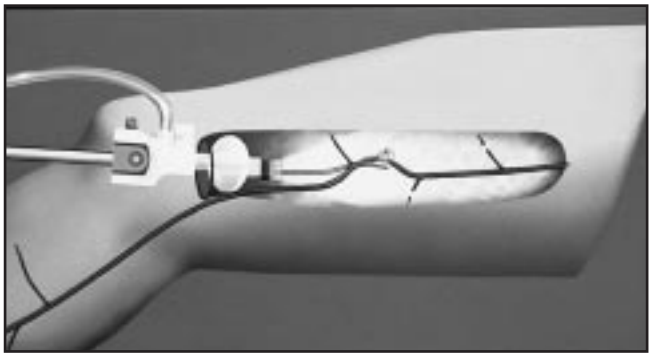
Initiating CO_2 insufflation: Insufflate carbon dioxide gas through the blunt tip trocar and begin anterior, posterior, and tributary dissection with conical tip.



Dissecting the tunnel: Perform secondary balloon dilation by inflating and deflating the balloon with 40 cc of air.



Cauterizing and dividing tributaries: Insert the cannula to retract, cauterize, and divide the tributaries.



Running the vein: Deploy the vein cradle from the cannula, ensuring that the vessel is free.

Economic Outcomes

	EVH	Open	P value
Readmission for Leg Care	1 of 394 cases	3 of 191 cases	>0.20
Office Visits for Leg Care (total #)	48	205	<0.001
Length of Stay (days)	5.8±3.2	6.1±4.5	>0.20
Hospital Charges ($US)	51,540±21,084	49,958±23571	>0.20

Operative Data

	EVH	Open	P value
Vein Harvest Time (minutes)	38.2±11.8	25.3±10.8	<0.001
Harvest Site Closure Time	7.1±4.5	24.3±11.2	<0.001
Total Harvest Time	47.3±16.5	49.1±18.8	>0.20
Length of Vein Harvested (cm)	38.7±10.0	41.9±20.3	=0.10
Length of Harvest Incision(s) (cm)	5.2±3.0	35.5±21.3	<0.001
Length of Surgery (minutes)	218.3±69.9	215.1±52.8	<0.20

Systemic Complications

	EVH	Open	P value
Sternal Infections – Deep	1% (4 of 394 cases)	0.5% (1 of 191 cases)	>0.20
Sternal Infections – Superficial	0.3% (1 case)	1.6% (3 cases)	>0.20
Septicemia	0.5% (2 cases)	0.5% (1 case)	>0.20
Prolonged Ventilator Support	3% (12 cases)	4.2% (8 cases)	>0.20
Pulmonary Embolism	0.5% (2 cases)	1% (2 cases)	>0.20
Pulmonary Edema	1.3% (5 cases)	0%	>0.20
Pneumonia	1.8% (7 cases)	1.0% (2 cases)	>0.20
ARDS	0.5% (2 cases)	0.5% (1 case)	>0.20

NEWS BRIEFS

Vein-based treatment could aid stroke recovery

Retrograde transvenous neuroperfusion could help prevent disability in stroke survivors, according to a new study.[1]

Researchers are looking at an emergency treatment that uses veins to send blood back to areas of the brain threatened by stroke. "We're able to treat patients within the first seven hours after the onset of [stroke] symptoms," writes study author **John Frazee**, MD, from the University of California at Los Angeles School of Medicine.

His and his colleagues' technique depends on using the brain's "other" vascular system — the veins that drain deoxygenated blood back to the lungs and heart. The experimental procedure uses some of those veins to transfer blood to organs in a retrograde, or opposite-direction, manner.

In experiments with baboons, the team channeled freshly-oxygenated blood from an artery in the animals' groins into small mechanical pumps, then pumped it into tubes or catheters placed in the back of the head into a major vein. The procedure allows the surgeon to direct the flow of blood backward into the brain or into the tissue that is not getting a blood supply.

All of the baboons used in the study had suffered an artificially-induced stroke one hour prior to the procedure. The researchers report that, by using the venous technique, they effectively reversed stroke-related brain tissue damage in the affected animals. Frazee writes that the success of those studies "has led us to do experimental trials in (human) patients."

The positive results of early human trials suggest that post-stroke neurological damage can be minimized even when venous interventions are initiated as late as seven hours after stroke onset. This is a much wider window of opportunity than that afforded by current emergency stroke treatments, including the use of clot-busting tissue plasminogen activator drugs.

Reference

1. Frazee JG, Luo X, Luan G, et al. Retrograde transvenous neuroperfusion: A back door treatment for stroke. *Stroke* 1998; 29:1,912-1,916. ▼

Warn patients about small blood pressure monitors

Finger-type electronic blood pressure monitors are less accurate and consistent than arm and wrist types, a recent study reports. Researchers tested 13 models of blood pressure gauges, priced between $880 and $1,480, and compared readings on them with those on the mercury-type blood pressure gauge. The results varied among models, but some arm and wrist types were found more accurate and consistent than those used on fingers. The finger types had greater deviations, with some of the systolic readings differing by more than 10 mmHg on average. ■

Brits approve thrombolytic therapy for heart attack

British physicians are finally making official the theory that lives can be saved by administering thrombolytic drugs to acute myocardial infarction (AMI) patients before sending them to the hospital. A guideline issued by the British Heart Foundation in London recommends that AMI patients receive thrombolytics within 90 minutes of calling for help.[1]

Researchers tracked time between a call for help and the delivery of thrombolytic drugs in 1,000 Scottish patients with suspected AMI, of whom half lived in rural communities and half in urban or suburban areas. A third of patients living in rural areas were given thrombolytic drugs by their physician within 45 minutes of calling. The rest incurred a 150-minute delay when they were taken to the hospital before the initiation of thrombolytics. All urban and suburban patients were taken to the hospital, and the call to thrombolysis time was about 100 minutes. Within this group, the interval time was shortened by 38 minutes when patients were taken directly to a coronary care unit instead of to the emergency department.

The researchers said the failure of urban and suburban physicians to administer thrombolytic drugs faster was due to habit. "The delay is inordinate," they said. They advise that thrombolytic

treatment be given, if practical, before the patient is transported, and by the first qualified person to see the patient.

Reference

1. Rawles J, Sinclair C, Jennings K, et al. Call to needle times after acute myocardial infarction in urban and rural areas in northeast Scotland: A prospective observational study. *British Medical Journal* 1998; 317:576-578. ▼

Cumulative epinephrine: Is it dangerous?

Epinephrine plays a critical role in improving blood flow to the heart and brain during cardiopulmonary resuscitation and in restoring spontaneous circulation, but it can have deleterious side effects after restoration.

It is common practice to increase cumulative doses of epinephrine during resuscitation after heart attack, but investigators recently showed that the practice can have negative neurologic outcomes.[1]

Investigators looked at the progress of 178 ventricular fibrillation patients who were administered a median cumulative epinephrine dose of 4 mg. In 151 patients, spontaneous circulation was restored, and 63 of those had favorable neurologic recovery.

New guidelines due in 2000

Patients with unfavorable cerebral performance received a significantly higher cumulative dose of epinephrine than was administered to patients with favorable cerebral performance — 4 mg compared with 1 mg. After possible cofounders were controlled for, the cumulative epinephrine dose remained an independent predictor of unfavorable neurologic outcome.

An editorial accompanying the study says that by 1992, the American Heart Association (AHA) had adopted graded resuscitation recommendations, reflecting an increasing reliance on evidence-based guidelines.[2] The regular dose of epinephrine used in cardiopulmonary resuscitation — 1 mg IV every 5 minutes — has remained the standard for more than 25 years and continues to be the first and most important pharmacologic intervention in adult cardiac arrest. Higher doses — 5 mg or about 0.1 mg/kg — remain a class IIb recommendation for adults, to be used only after the 1 mg dose has failed. The AHA will publish new resuscitation guidelines in the year 2000.

References

1. Behringer W, Kittler H, Sterz F, et al. Cumulative epinephrine dose during cardiopulmonary resuscitation and neurologic outcome. *Ann Intern Med* 1998; 129:450-456.

2. Cummins RO, Hazinski MF. The next chapter in the high-dose epinephrine story: Unfavorable neurologic outcomes? *Editorial. Ann Intern Med* 1998; 129:501-502. ▼

Lepirudin may prevent heart attacks, death

New research shows that unstable angina patients who take lepirudin (Bridgewater, NJ-based Hoechst Marion Roussel's Refludan) are less likely to have a heart attack, need invasive cardiac procedures, or die compared to patients treated with standard therapy. A study presented in August at the 20th congress of the European Society of Cardiology in Vienna showed that treating heart patients with lepirudin over a three-day period prevents seven additional deaths or heart attacks and 14 invasive interventions for every 1,000 people treated. The study evaluated the effects of lepirudin, a direct thrombin inhibitor, compared to standard heparin, an indirect thrombin inhibitor, in treating patients with unstable angina. More than 10,000 patients were randomly assigned to receive a 72-hour double-blind IV infusion of either heparin or lepirudin.

The combined rate of cardiovascular death and heart attack in the lepirudin group was reduced by 24% at the end of treatment. The rate of cardiovascular death, heart attack, and refractory angina was reduced by 22%. The benefits of lepirudin treatment were maintained throughout the 35-day follow-up period. After treatment was discontinued, deaths, heart attacks, and other events reflecting continued presence of clot in the coronary arteries occurred at the same rate in both groups. In particular, there was no evidence of clinical rebound following drug withdrawal, of concern in other trials of antithrombotic drugs for coronary events.

Lepirudin is a potent anticoagulant that inhibits the enzyme thrombin, which plays a pivotal role in the coagulation cascade leading to clot formation. Unlike heparin, which inhibits thrombin indirectly by activating a protein known as antithrombin III, lepirudin directly blocks the enzyme's activity not only in the circulation but also in the clot itself.

Regulatory filings are currently in progress. In clinical studies of lepirudin, bleeding from puncture sites and wounds was the most common side effect. Concomitant use with thrombolytics can result in intracranial bleeding. Other events included anemia, hematoma, hematuria, fever, and abnormal liver function. ■

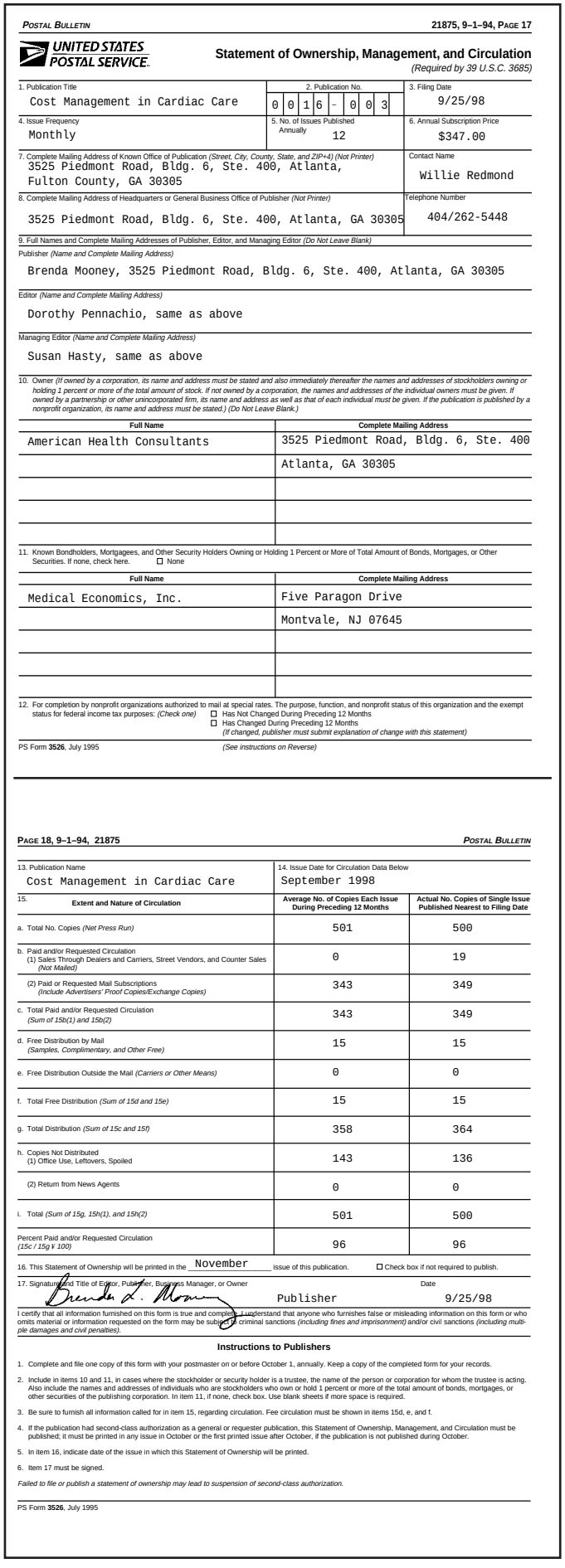
PET can determine stroke risk

Is carotid occlusion an independent predictor?

Investigators from Washington University in St. Louis, recently studied 81 patients who had suffered a stroke or a transient ischemic attack to determine whether a subgroup of people with carotid artery occlusion have an independent risk factor for suffering a subsequent stroke.[1] Using positron emission tomography (PET), they measured which of the participants were in stage II hemodynamic failure, an indication that the brain is not receiving enough oxygenated blood to function normally. The ability to pinpoint those in hemodynamic failure allows researchers to determine who may most likely have carotid artery occlusion, which increases a person's chances of having a stroke. A majority of people with occlusion may not know they have it because they do not experience symptoms.

The researchers found that of the 81 patients, 39 had stage II hemodynamic failure on one side of the brain and 42 did not. The researchers determined that subgroup of 39 was six times more likely to suffer an overall stroke and more than seven times more likely to suffer a stroke on one side of the brain than those who did not have stage II hemodynamic failure.

Following the patients for four years, the researchers found that stroke occurred in 12 out of 39 patients in the subgroup but only three out of 42 patients who were not. Eleven of 39 patients



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UNITED STATES POSTAL SERVICE

Statement of Ownership, Management, and Circulation
(Required by 39 U.S.C. 3685)

1. Publication Title	2. Publication No.	3. Filing Date
Cost Management in Cardiac Care	0 0 1 6 - 0 0 3	9/25/98
4. Issue Frequency	**5. No. of Issues Published Annually**	**6. Annual Subscription Price**
Monthly	12	$347.00

7. Complete Mailing Address of Known Office of Publication *(Street, City, County, State, and ZIP+4) (Not Printer)*: 3525 Piedmont Road, Bldg. 6, Ste. 400, Atlanta, Fulton County, GA 30305 — Contact Name: Willie Redmond

8. Complete Mailing Address of Headquarters or General Business Office of Publisher *(Not Printer)*: 3525 Piedmont Road, Bldg. 6, Ste. 400, Atlanta, GA 30305 — Telephone Number: 404/262-5448

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor *(Do Not Leave Blank)*

Publisher *(Name and Complete Mailing Address)*: Brenda Mooney, 3525 Piedmont Road, Bldg. 6, Ste. 400, Atlanta, GA 30305

Editor *(Name and Complete Mailing Address)*: Dorothy Pennachio, same as above

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13. Publication Name: Cost Management in Cardiac Care — 14. Issue Date for Circulation Data Below: September 1998

15. Extent and Nature of Circulation	Average No. of Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
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i. Total *(Sum of 15g, 15h(1), and 15h(2)*	501	500
Percent Paid and/or Requested Circulation *(15c / 15g x 100)*	96	96

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in the subgroup suffered stroke on one side of the brain while only two out of 42 not in the subgroup suffered a stroke on one side.

"Although this study establishes that stage II hemodynamic failure is a strong predictor of subsequent stroke in patients with symptomatic carotid occlusion, it cannot establish the mechanism for these subsequent strokes," the researchers write. "The demonstration of hemodynamic failure at baseline does not necessarily prove that all subsequent strokes are hemodynamically mediated."

An accompanying editorial states that the study provides potentially important information that may help reopen the previously closed door on surgical therapy for carotid artery occlusion.[2]

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Cost Management in Cardiac Care (ISSN 1087-0644) is published monthly by American Health Consultants®, 3525 Piedmont Road, Building Six, Suite 400, Atlanta, GA 30305. Telephone: (404) 262-7436. Periodical postage paid at Atlanta, GA 30304. POSTMASTER: Send address changes to **Cost Management in Cardiac Care**, P.O. Box 740059, Atlanta, GA 30374.

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Customer Service: (800) 688-2421 or fax (800) 284-3291, (custserv@ahcpub.com). Hours: 8:30 a.m.-6 p.m. Monday-Thursday, 8:30 a.m.-4:30 p.m. Friday, EST.

Subscription rates: U.S.A., one year (12 issues), $429. Outside U.S., add $30 per year, total prepaid in U.S. funds. One to nine additional copies, $215 per year; 10 or more additional copies, $129 per year. Missing issues will be fulfilled by customer service free of charge when contacted within 1 month of the missing issue date. **Back issues**, when available, are $38 each. (GST registration number R128870672.)

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