WHAT'S A JOINT LIKE YOU DOING IN A RACE LIKE THIS?

Maybe the knee is not made for our way of life • BY SUE HERTZ

The doctor from Buffalo was late, and Bobby Orr was antsy. This was his fifth knee operation since he joined the Bruins nine years before, in 1966, and Boston's most cherished athlete was eager to be rid of the bone fragments that were lodged in his left knee, locking it when he stepped out of the car or onto the rink. The sooner the surgery, the sooner he'd be back on the ice to finish the 1975-76 season. Orr knew he was on borrowed time, that his knee was rapidly eroding, and his skating years were numbered. But he thought he had enough for the Bruins to renew his soon-to-expire contract.

The problem, and the reason for the delay that morning at Massachusetts General Hospital, was that the Bruins weren't so sure. This was Orr's second operation of the season; he had already missed the first 12 games, and it was only November 29. The team's new owner, the Jacobs family of Buffalo had summoned a physician from its hometown to observe this operation and assess how many more spins around the ice Orr's knees could handle. But the clock ticked and still there was no doc, and Orr was tired of waiting.

"Fix me," he told his surgeon, Carter Rowe.

Out Orr went under anesthesia, and just as he was sliced open, the doctor from Buffalo arrived and greeted the surgical team. Ugh, thought Dennis Griffin, then a young resident studying under Carter Rowe, as his eyes followed the visiting doctor's. The cartilage encasing Orr's bones was a dingy yellow, not a healthy, creamy white, and instead of being smooth, it was as rough as a cobblestone street. Spurs littered the bone. And the two shock-absorbing cartilages between the leg bones were gone, removed during earlier operations. The left knee of 27-year-old Bobby Orr looked to Griffin like an elderly man's, ready for replacement.

The doctor from Buffalo nodded goodbye to the surgical team members as they toiled, and left. "That's it?" thought Griffin. That was it. Bobby Orr's contract was never renewed; seven months later he signed with the Chicago Black Hawks as a free agent. Two years and five months later, in 1978, he retired from professional hockey.

Today Bobby Orr can't bend his knee 45 degrees or bicycle a full revolution. "Knees," he says, searching for a word to describe the joints: "Terrible."

Continued on page 61

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The knee

CONTINUED FROM PAGE 16

But the complaints don't stop with hockey champs; everyone has a knee story. Jog that extra mile and the kneecap throbs. Bike that hill and the iliotibial band burns. Plant that cleated foot wrong and the ligament pops. And watch out for potholes. Despite the revolution in knee care in the past 15 years, the junction of the upper and lower leg bones, or, in anatomical terms, the femur and tibia, remains a headache. We still limp.

We've limped before. As long as humans have slid into third base or scrubbed floors, tendons have stretched and bursas have bruised. And although hands (always flailing, begging for abuse) and ankles (forever in danger of a sprain) are most frequently injured, knee ailments soar. Blame it on aerobics videos, on marathons, on our inability to say one game is enough, but knees are battered more than ever. Since 1979, the number of emergency room visits for knee complaints in the United States has almost doubled, averaging almost 500,000 a year. And that doesn't include visits to private physicians. One study by the Center for Sports Medicine at St. Francis Memorial Hospital, in San Francisco, found that in high-injury activities such as basketball, running, and gymnastics, knee maladies were more frequent than the next three injuries to other parts of the body combined. Closer to home, Michael Lovett, a physical therapist at the North Shore Sports Medical Center, in Danvers, sees an average of 40 patients a day, half of whom require knee work.

"The knee," Lovett says, "is not made for our lifestyle."

That, of course, depends on the lifestyle. For most of us, the knee functions perfectly during afternoons on the couch or strolls around Coolidge Corner. Danger enters when you lace up your sneakers and trot on asphalt from Hopkinton to Boston. "We're placing new demands on it," says Bertram Zarins, the orthopedic surgeon for the Bruins and Patriots.

Look at skiing. When the sport was new and ski boots were low, ankles suffered. But as boots rose, knees absorbed more pressure. Since 1978, 60 percent of all skiing injuries in this country have been knee-related, according to Zarins, compared with 35 percent before 1973.

Zarins estimates that 100,000 knees are hurt each year on US ski slopes, which, according to the Consumer Product Safety Commission, represents more than a fifth of all knee injuries.

And football, while never gentle to the joint, has become even more hazardous. "The kids are getting bigger and stronger," says Randy Shrout, head football trainer at Boston College, which means that more weight hits an opponent when tackled. Complicating matters is artificial turf, which allows for greater traction and speed. The faster that players run, the harder they fall. The better their feet grip, the better the chance that the foot sticks in one direction as the body pivots in another.

Perhaps if our legs were shorter, like those of our ancestors, our knees could tolerate the abuse. But they're not, sighs Stan James, the surgeon in Eugene, Oregon, who operated on Joan Benoit's knee 17 days before she won the Olympic Marathon Trials. "I suppose," he says, "the knee could be better designed."

But the knee is flawlessly designed — at least in theory. Part pulley, part hinge, the knee is powered by muscles and tendons and held together by two ligament systems. The four muscles on the front of the thigh, the quadriceps, flex and drive the knee, and are linked to the kneecap via the quad tendon. Cut that and your leg is as good as a paper clip. If all works properly, the knee will bend 125 to 150 degrees.

Two major ligament systems hold the femur and tibia together. Providing side-to-side stability, the collateral ligaments run up both sides of the knee. The medial collateral ligament (MCL), the larger of the two, is on the inside, and the lateral collateral ligament (LCL) is on the outside. The MCL is frequently injured; when the knee is banged from the outside, the LCL compresses and the MCL stretches, a common danger on ski slopes. On the other hand, the LCL is injured less, since the knee isn't as likely to be hit from the inside, which means the stress on the two ligaments would be reversed.

The cruciate ligaments cross within the knee, preventing the bones from slipping backward and forward. The anterior cruciate ligament (ACL) is in front, and the posterior cruciate ligament (PCL) is in back. To hurt the latter, which is rare, the knee must be struck from above, such as hitting a dashboard. The ACL, which is the size of a little finger, is vulnerable to stretching and, according to William Southmayd, the doctor who began the national chain of SportsMedicine clinics, is responsible for 60 percent of serious knee-ligament injuries.

When the ACL goes, the cartilage is vulnerable and often rips with the ligament. The knee harbors two kinds of cartilage: the joint surface cartilage, which envelops the bone, and the two menisci, the lateral (outside) meniscus and medial (inside) meniscus, which act as bumpers between the two leg bones. Without the ACL, the knees are loose and easily shift, sometimes tearing a meniscus. Football players worry about the "unhappy triad": ripping both ligaments and a meniscus. The knee can operate successfully with only one meniscus, but remove both and bone grates against bone. The knee will lock and probably be riddled later with degenerative arthritis.

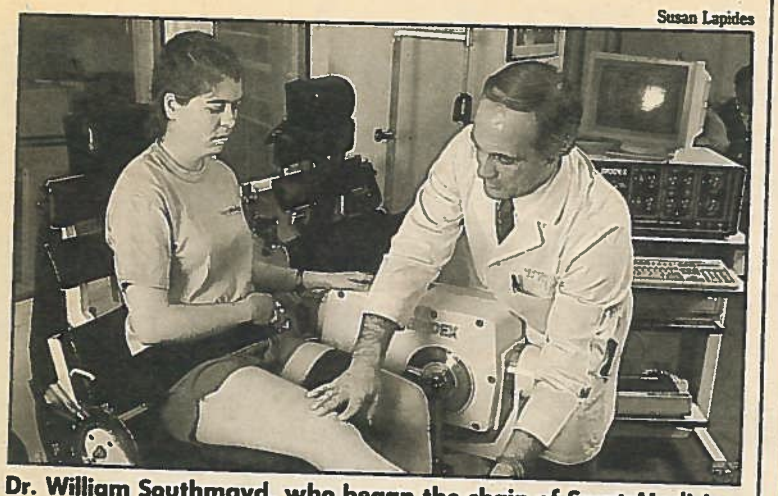
But long before arthritis strikes, our knees buckle with a legion of other ailments. Chondromalacia. Bursitis. Patellar tendinitis. Or, in our terms, runner's knee, housemaid's knee, jumper's knee.

But should we blame our knees, or ourselves?

David Jonson was happily jogging around the track at the Woonsocket, Rhode Island, YMCA four years ago when he was asked to even the teams for a pickup basketball game. At 47, Jonson, an executive vice president for Consumer Value Stores, hadn't played a full-court game in years. Why not join in, he thought. He was in pretty good shape.

He twisted in the air as he leaped to receive the ball and landed in a heap, his leg pinned underneath him. He heard a snap, felt piercing pain and then a dull throb. To quit the game meant uneven teams, but when he tried to stand, all he could do was yelp in pain.

Susan Lapides



Dr. William Southmayd, who began the chain of SportsMedicine clinics, with a patient on a testing and exercise machine.

The X-rays showed no break, and after a few days Jonson could walk without pain. But he could feel the knee shift, as if nothing held it in place. Indeed, there wasn't much. David Jonson had torn his anterior cruciate ligament. Without his ACL, his femur slid back and forth on his tibia, causing his knee to buckle when he walked downstairs or turned too quickly.

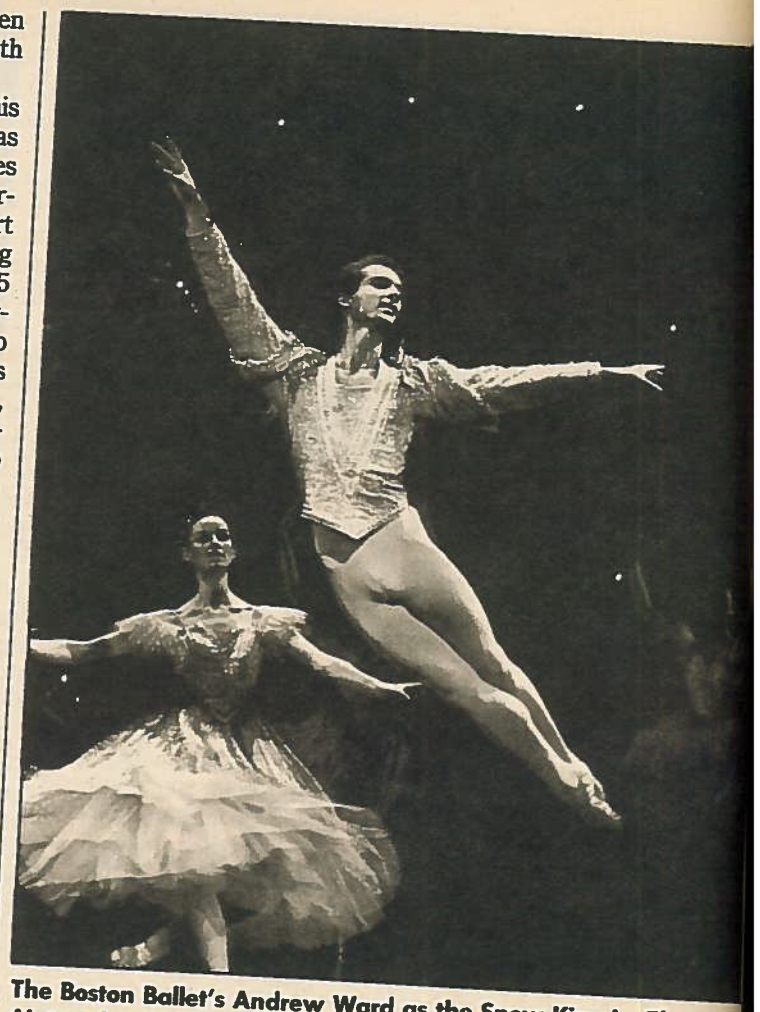
He had two options: surgery or intense rehabilitation. If he chose the first, his ligament would be rebuilt with a stolen tendon, probably from the hamstring or kneecap, or perhaps from the iliotibial band (the tendon that runs from the hip to the outer knee). After the 2½-hour operation, Jonson would hobble with a full leg cast for at least six weeks, then endure six to nine months of physical therapy. Or, as the Lahey Clinic Medical Center recommended, he could skip surgery and try to strengthen the muscles surrounding the knee to the point where they would compensate for the missing ligament.

Jonson chose therapy, but after a year passed and he still could not ski, run, or even walk without his knee popping out, he sought more advice, first

from the Lahey Clinic, then from William Southmayd. Both recommended surgery.

Without the operation, his knee lacked stability and was prone to reinjury; the bones could slide sharply and rip a cartilage. At Mass. General, Bert Zarins was leery of suggesting surgery for patients over 45 who aren't in high-risk categories, which include people who are loose-jointed (their bones slide out of place easily and, consequently, need the ligament support) and those who play sports that require pivoting or jumping. Older people often do worse after surgery, stiffening easily. Likewise, Southmayd told Jonson that only 10 to 15 percent of his ACL patients require surgery, and he was one of them. Okay, Jonson agreed, build a new ligament.

On November 4, 1986, 2½ years after the injury, William Southmayd created a new anterior cruciate ligament for David Jonson. For eight weeks, Jonson endured a variety of casts, from plaster to plastic. That was the easy part. Then came four months of rehab — of therapists pushing his knee,



The Boston Ballet's Andrew Ward as the Snow King in *The Nutcracker*. "No dancer goes through a career without one major injury," Ward says. "There's always something niggling."

bending his knee; of lifting weights, riding the bike, and working the Cybex machine, a Nautilus look-alike that resists with the same weight the patient exerts.

His leg grew strong, but not strong enough. The scar tissue that had formed during his leg's immobilization caused his knee to swell when he played tennis or walked too much. Last December, the tissue was removed by arthroscopic surgery — a revolutionary operation that gives physicians direct access to the knee's interior via a tiny tube inserted through an equally tiny incision — but he's still afraid to ski. What if he falls? "Skiing would be nice," he says, "but it's more important to get around."

Likewise, Jim Deady reluctantly bid so long to baseball and running and basketball. Deady, a 25-year-old construction worker from Danvers, was fleeing the enemy behind Rich's department store in Salem during a round of the Survival Game a year and a half ago. He thought his left ACL, which he had partly torn almost two years before, was in good shape. But as he fired his last paint pellet and ran up a hill, he hit a rut. Pop. Eight months of casts and braces and therapy later, he harbors a new respect for his joint. "The knee is very sensitive," he says. "You got to treat it nice."

Knees are like tires, says Dennis Griffin, who left his residency at Mass. General to open his own practice and later become Boston College's orthopedic surgeon. We're born with a certain amount of mileage, and every step subtracts from the life of the knee. Run, and you multiply the wear by three, four, sometimes five, depending on the running style. Smart runners alternate their miles with other exercise, say swimming or biking, even rest. But doctors know there is no such thing as a smart runner, that nothing short of a broken leg will keep most from donning their Nikes. "Runners," Lovett says, "keep us in business."

A partly torn tendon didn't stop Liz Cremens, a 40-year-old Boston lawyer, from running the New York Marathon in 1984. In fact, she didn't cut down her mileage until she

ripped a cartilage and was diagnosed with chondromalacia, a roughening of the cartilage behind the kneecap that results from overuse. After arthroscopic surgery to cut away the frayed cartilage in August of '85, her doctor advised, "Let pain be your guide." She did. She swims more, plays tennis less — and runs six miles max at a time.

Charles Rodgers, Bill's older brother, slammed into a parking meter during a run two years ago and has coped with bursitis ever since. Once labeled "housemaid's knee," bursitis results when one of the knee's 14 bursae, or sacs, which act as ball bearings, becomes inflamed. Rodgers, 41, runs six miles comfortably, and when the knee aches, he pops a few Advil. "But I cannot do what I really like to do," he says. "Run nine miles a day."

Runners aren't the only stubborn ones. After his first operation for "jumper's knee," or tendinitis, Andrew Ward promised himself that if the patella tendons flamed up again, he'd quit dancing. Ward, who was born and raised in England, had danced with the Royal Ballet for six years when he first felt the stabbing pain in the center of his left knee every time he pushed off for a jump. Exercises, anti-inflammatory shots — nothing worked. He underwent surgery to scrape off the tendon abrasions, which caused the pain, believing he'd jump again in six weeks. It took a year.

For three years his knee cooperated. But the morning after a 7½-hour rehearsal of *The Nutcracker* with the Boston Ballet, which he had joined the year before, in 1983, he woke with a puffy knee. "I'll work through this," he thought.

He exercised his quads and took anti-inflammatory drugs, anything to ease the searing pain as he danced the parts of the Arabian and the Snow King. The following May, the tendons were scraped again at Children's Hospital.

So far, so good, although Ward, 28, avoids kneeling on stage. Sure, the tendinitis could return. But "no dancer goes through a career without one major injury," Ward says. "There's always something nig-

gling."

Despite what the injured might think as they wince through rehab, medicine is striving to shorten the agony, or at least cushion it. Knee treatment is a different art from what it was when Dennis Griffin first practiced orthopedic surgery 11 years ago.

The arthroscope was the first giant coup in the knee-care revolution, which began in the mid-'70s. The scope is an instrument that allows physicians to snip loose cartilage, even repair some ligaments, without opening the knee for major surgery.

Through a ¼-inch incision, a tiny television camera is inserted through a telescope, which "scopes" the inside of the knee. The camera projects a picture into a monitor next to the physician. For repairs, the doctor makes another incision, perhaps two, for the tiny operating instruments, which include scissors, forceps, and a biter that looks like a clamp on a jumper cable, except that it's as slim as a knitting needle.

Recovery time is minimal. Rarely do scope patients stay overnight in the hospital, and, depending on the problem, many are back to normal activity in a month or so. The scope, however, is not a panacea. Examples of athletes like Joan Benoit have created "unrealistic expectations," says Zarins. Less than three weeks before the Olympic Marathon Trials, Benoit's knee was scoped to detect the source of a constant ache. Stan James discovered a little band of tissue at the tender spot. "I cut it with scissors, heard a snap, and got out," he says. Yes, she won the marathon, but the repair was minor and her rehabilitation intense. "This was not a typical response," he says. He could perform the same operation on 10 people, and perhaps Benoit would be the only one to recover so well.

Not all knee repair can be performed with an arthroscope, but Griffin predicts that as the instruments and techniques become more sophisticated, more ligaments will be reconstructed via tiny incisions and thus reduce the trauma to the knee.

In addition, the scope diagnosis may be challenged in the future by magnetic resonance imaging, a five-year-old technique. The patient is moved slowly through a $2 million machine that looks like a giant cylinder — 8 feet long, 30 inches in diameter — and films images of the anatomy. Unlike an X-ray, MRI projects no radiation, and unlike arthroscopy, it is noninvasive and doesn't require anesthesia. Gregory Shoukimas, clinical director of West Suburban Imaging, one of the 15 places in Greater Boston offering MRI, says the technique can detect the difference between a meniscus tear and degenerative wear, which means the physician will know if surgery is required (for the tear) or the degeneration just observed. "I don't know where it fits in for the average person," says Griffin, who cites the cost at $600 to $800, but he says it is "new and exciting and it may, if not replace, assist arthroscopy in diagnosing complex knee problems."

Advances in techniques for operating on those problems progress slowly. To supplement ligament reconstruction, medicine has experimented with synthetic fibers. So far, however, Gore-Tex is the only one approved by the Food and Drug

Continued on page 71

The knee

CONTINUED FROM PAGE 68

Administration. The rejection rate is high, and Griffin says, "It is better to use something that belongs in the body [a borrowed tendon] than one that doesn't."

Cartilage transplants are even trickier. Although scientists experiment with cadaver meniscus transplants in animals, the procedure has yet to be tried on humans. As with ligaments, the rejection rate is high, and anchoring the meniscus so it doesn't slip out of place is even more difficult. "You just can't shove something in new and expect it to act as a shock absorber," says Griffin.

There are, however, success stories. In Pennsylvania, one woman's entire knee was replaced with that of a young accident victim. Knees are more commonly replaced — more than 80,000 a year — with prostheses of plastic and metal. Arthritis sufferers, such as Bobby Orr, are prime candidates. But since the lifespan of artificial joints is limited, the surgery is usually reserved for those over 60.

Bobby Orr, however, reads a lot about the operation.

On a January morning the most famous knees in Boston are covered by gray flannel slacks. Orr is 40, and his face is fuller than it was in the '69 and '72 Stanley Cup playoffs. But the eight-time NHL All-Star Defenseman is still youthful, still gracious, still trim, although his workouts are limited to 20 minutes on his Stairobic machine. He doesn't skate anymore, and he can't run. He plays a lot of golf and occasionally games of tennis doubles, in which he says he "stands around a lot."

After six operations during his NHL career, Orr says he wonders if his career would have been longer had he played hockey during the "scope" era. In his day, the knee was opened and the entire meniscus was removed for even a tear. Today he might not have had scars upon scars and might have had some cartilage left.

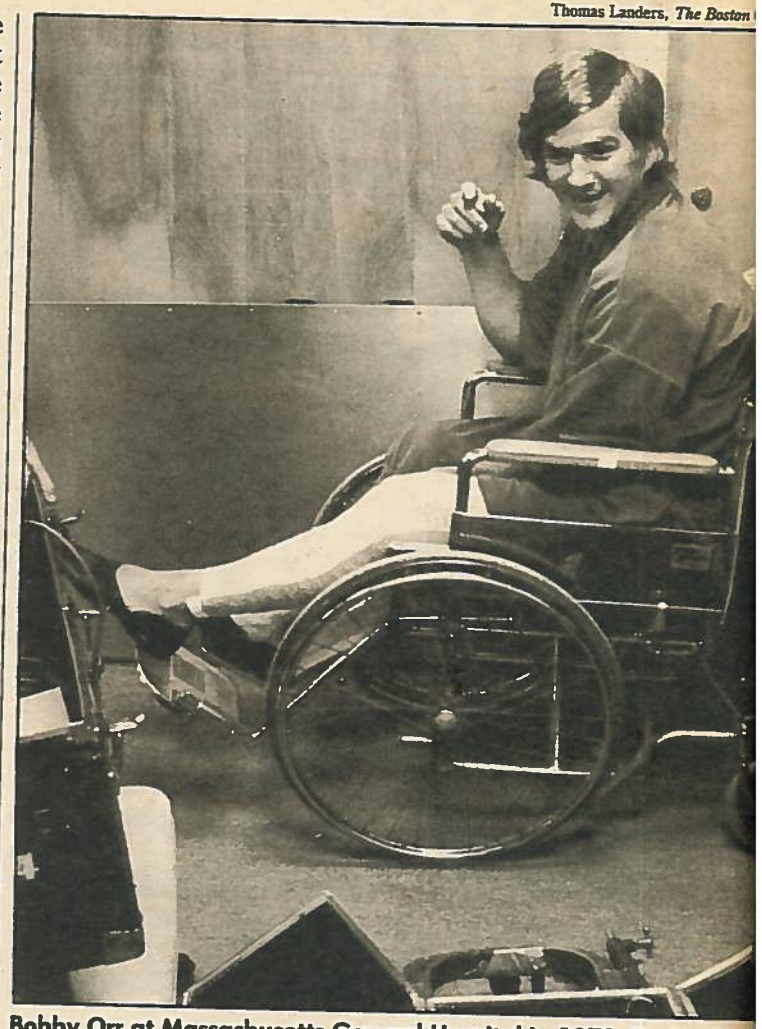
Medicine isn't moving fast enough for Bobby Orr. The scope helps — he's had four arthroscopic operations to clean

out loose bone fragments since he retired — but nothing short of a replacement could ease the nagging ache or prevent the bone chips from wandering through the joint. Once, during a salmon fishing trip in Canada, his knee was jammed for three days before he jiggled out the intruding pieces.

"I have the knee of an elderly person," he mutters. He realizes he's too young for a knee replacement, but maybe if he researches hard enough, he'll find a solution. Any solution. In the meantime, Orr concentrates on his work representing BayBanks and helping out with the New England branch of Pendick Press, which prints legal and financial documents. He admits he pushed the limits, that hockey is a contact sport, "and I carried the puck. You get hit a lot." He pauses. "Maybe if I changed my style, I would have lasted longer."

He might have, but he wouldn't be the Bobby Orr we revere today. He looks down at his left knee, unable to forget that his world could have been different had it not been for what lies underneath the scars. •

Thomas Landers, *The Boston*



Bobby Orr at Massachusetts General Hospital in 1972. During his career as a hockey player, he endured six operations on his knee.