

Why I Needed an Alternative to Traditional Navigation

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Like many spine surgeons, I adopted traditional spinal navigation (TSN) because it worked.

It improved accuracy. It reduced uncertainty. And in the right setting, it delivered consistent results.

But over time, it became clear that TSN also introduced new problems that had nothing to do with screw placement and everything to do with workflow.

When Navigation Becomes the Bottleneck

TSN adds structure to surgery, but it also adds steps.

Setup is not trivial. Imaging has to be acquired. Systems have to be registered. Equipment has to be positioned and verified. None of that shows up in the operative note, but all of it counts as OR time.

Hospitals pay for that time. Patients are under anesthesia during that time. Staff wait during that time.

In many settings, TSN also requires:

- Multiple C-arms or intraoperative CT
- Large OR footprints
- Dedicated navigation technicians
- Software systems that require maintenance and updates

That model works best in large academic centers. It works far less well in community hospitals, critical access hospitals, and ambulatory surgery centers.

Those limitations aren't theoretical. They affect where surgery can happen and who has access to it.

Looking for Something Simpler

As spine surgery moved toward smaller incisions, the margin for error at the point of access narrowed.

At the same time, navigation systems were becoming larger, more complex, and more dependent on imaging and infrastructure that didn't match the way cases were actually being done.

I didn't need more screens.

I didn't need more radiation.

I needed directional confidence, delivered simply.

That was my introduction to NavJam, a Jamshidi needle with integrated directional guidance built on the RJB platform.

How I Think About NavJam

I don't think of NavJam as "navigation" in the traditional sense. It is an alternative to traditional navigation that is equally accurate yet eliminates much of the time and complexity associated with TSN.

I think of it as a compass. It doesn't tell me how to operate. It doesn't replace fluoroscopy or judgment. It gives me real-time feedback about whether my trajectory is safe and centered before I commit further.

That feedback comes from the RJB, a directional guidance platform that uses spatial orientation rather than radiation-based imaging to confirm trajectory. Instead of building navigation around large imaging systems, the RJB delivers guidance directly at the point of access.

For surgeons trained to think spatially, that distinction matters.

What Changes in the OR

The first thing I noticed was what wasn't required.

There was no prolonged setup.

No registration process.

No room reconfiguration.

You open it and use it like a Jamshidi needle—because that's what it is.

In practice, the value shows up in three places:

- Directional confidence

- Reduced fluoroscopy
- Time

In a recent case, I knew my hand needed to be approximately 24 degrees off midline to stay centered in the pedicle. I still used X-ray, but I used less of it with more confidence.

As neurosurgeons, spatial targeting is foundational. Early in training, one of the first things you learn is how to place a needle precisely in a three-dimensional space under pressure.

NavJam builds on that instinct rather than replacing it.

Radiation Is Not an Abstract Concern

Radiation exposure accumulates. It affects patients, staff, and surgeons over the course of a career.

TSN often replaces fluoroscopy with other forms of radiation rather than eliminating it. Intraoperative CT and O-arm systems still expose everyone in the room.

With NavJam, I can work with:

- One C-arm instead of two
- Less fluoroscopy overall
- Shorter imaging time

That reduction matters, especially in high-volume practices.

Speed Without Rushing

I expected the learning curve to be steep. It wasn't.

The first time I used NavJam in a live case, nothing felt foreign. The technique didn't change. The workflow didn't expand.

What did change was the clock. We cut roughly 30 minutes off the procedure. A lumbar fusion that typically took about two and a half hours took closer to two.

Why Hospitals Should Care

Hospitals often focus on surgical time. What gets overlooked is that preparation time costs the same.

Every minute spent setting up navigation is a minute of paid labor—staffing, anesthesia, overhead.

NavJam changes that equation:

- No capital investment
- Single-use disposable
- No software or upgrade fees
- No specialized navigation technicians
- Minimal OR footprint

Those factors matter to value analysis committees. They matter even more to smaller hospitals that want to offer spine surgery without massive infrastructure investments.

Access Is the Real Issue

I practice in Ohio. Parts of Ohio might as well be mission trips.

There are hospitals where patients travel 30 or 50 miles for basic spine procedures because the facility doesn't have biplane fluoroscopy or advanced navigation.

That shouldn't be acceptable.

A kyphoplasty or lumbar fusion shouldn't require leaving your community because the hospital can't afford an O-arm.

NavJam allows surgery to be done safely with:

- One C-arm
- A small OR
- Existing staff

That expands access in a meaningful way.

Ambulatory Surgery and the Missing Piece

In my view, navigation has been one of the final barriers preventing broader migration of lumbar fusion into ambulatory surgery centers.

ASCs don't have space for large navigation systems. They don't want the cost. And they don't want the staffing burden.

NavJam fits that environment.

It doesn't require a robot.

It doesn't require intraoperative CT.

It doesn't require a dedicated navigation team.

If we are serious about lowering the cost of care without lowering standards, this matters.

Accuracy Still Matters

Efficiency is meaningless if accuracy suffers.

The RJB platform was cleared through the De Novo FDA pathway, which requires demonstration of safety and effectiveness relative to existing approaches. The FDA determined that it meets accuracy expectations comparable to TSN for its intended use.

That clearance is critical.

There is no trade-off where speed comes at the expense of placement quality.

Training the Next Generation

Early academic experience has been telling.

At Stanford University, an early case initially raised concerns because the device wasn't used as intended. Once that was recognized, the perspective shifted.

By the end of the case, the attending surgeon described it as a training tool he wanted fellows, residents, and attendings to use—and said they were now using it above traditional navigation.

That matters. What we train surgeons on shapes future standards of care.

A Tool, Not a System

NavJam and the RJB are not robots. They are not imaging platforms.

They combine familiar elements—a needle and directional guidance—into something that makes access more predictable without making surgery more complicated.

Surgeons should not be intimidated by this tool. At the end of the day, it's a compass and a needle. Tell me the direction and how much, and let me do the rest.

Closing Thoughts

Traditional navigation isn't going away. It works.

But it isn't practical everywhere, and it isn't efficient in every setting.

What NavJam offers is a middle path:

- Faster than TSN
- Simpler than TSN
- Accurate enough to meet FDA standards
- Practical in hospitals that have been left out

That combination is why I use it.

Sometimes progress isn't about adding more technology. It's about removing everything that gets in the way.

Rethinking the Cost of Navigation in Modern Spine Surgery

Dr. William Hunter

forthcoming in Healio

Navigation has become an expected component of modern spine surgery. Surgeons trained over the past decade are accustomed to operating with navigation systems, and hospitals that wish to support a contemporary spine program increasingly recognize navigation as a baseline requirement rather than an added feature. At the same time, reimbursement for spine procedures continues to decline, while the cost of delivering care—including technology, staffing, and maintenance—continues to rise. As a result, surgeons and hospital leaders are being forced to think more critically about how navigation is implemented and financed.

As a spine surgeon in my 28th year of practice, the question is no longer whether navigation improves accuracy. That has largely been established. The more relevant question is whether there are alternatives to traditional navigation systems that can preserve accuracy while reducing the financial and operational burden placed on hospitals and ambulatory surgery centers.

Operating room time remains one of the most expensive resources in surgical care. Although estimates vary, commonly cited analyses place the cost of a single minute in the operating room in the range of approximately \$40 to \$50. For hospitals and surgery centers, even modest improvements in efficiency or predictability can have meaningful financial implications when multiplied across case volume. Importantly, however, the economics of navigated surgery extend beyond operative minutes alone. Capital investment, annual service contracts, per-case support costs, and system reliability all contribute to the true cost of traditional navigation systems.

Accuracy in day-to-day surgical practice

I have used traditional navigation systems, including O-arm–based platforms, on a regular basis for many years. When I first used the NavJam navigated Jamshidi needle, my primary interest was to understand how it performed in comparison to the traditional navigation systems I already rely on daily. Specifically, I wanted to evaluate whether it could provide comparable accuracy while functioning as a smaller and more streamlined alternative to traditional navigation.

NavJam is a single-use Jamshidi instrument designed as an alternative to traditional navigation systems for percutaneous spinal access. Rather than relying on a capital navigation platform, trajectory and orientation are established using standard fluoroscopic images at the start of the case, then reproduced directly at the instrument level. This allows surgeons to achieve navigated access without pin placement, system registration, or intraoperative spins.

In my experience, it delivered accuracy that was comparable to that of traditional navigation systems. That observation was essential. Traditional navigation is valued for the confidence it provides, particularly the ability to trust a planned trajectory, reproduce it reliably, and proceed knowing that access can be achieved safely and consistently. This instrument provided that same level of confidence without requiring the infrastructure associated with large, capital-intensive navigation platforms.

Workflow simplicity and procedural flow

When surgeons and administrators evaluate navigation technologies, time is often the first metric discussed. In practice, however, workflow simplicity and procedural flow are just as important. Traditional navigation systems introduce multiple steps before meaningful work can begin, including pin placement, intraoperative spins, and registration of instruments. Each step adds complexity and creates opportunities for delay, particularly in busy operating rooms or ambulatory settings.

Rather than treating navigation as a separate system, a “smart” jamshidi needle incorporates guidance into the access instrument itself. This reduces setup complexity and early procedural friction, which can be especially valuable during initial access when efficiency sets the tone for the rest of the case.

From an operational standpoint, simpler workflows tend to be more reproducible. Fewer steps mean fewer dependencies on specialized personnel and fewer interruptions once the case is underway. Over time, this consistency can improve scheduling reliability and reduce variability across cases, which carries real economic value for hospitals and ambulatory surgery centers.

Capital investment and cost structure

The most significant economic distinction between traditional navigation systems and NavJam lies in capital investment. Large navigation platforms often require upfront expenditures ranging from approximately \$1 million to \$3 million. In addition to the initial purchase price, hospitals must budget for annual maintenance and service contracts that may exceed \$150,000 to \$200,000 per year.

These costs are incurred regardless of utilization and must be recovered over time before a program becomes profitable. In an era of declining reimbursement, this creates substantial financial pressure. Hospitals may need to perform a high volume of cases simply to offset the cost of owning and maintaining a traditional navigation system before realizing any margin.

This challenge is particularly pronounced in ambulatory surgery centers. ASCs often do not have the capital reserves necessary to invest in multimillion-dollar navigation platforms, yet navigated surgery is increasingly expected by surgeons and patients alike. In this setting, NavJam offers a fundamentally different economic model. Because it is single-use, there is no upfront capital expenditure and no ongoing maintenance contract. Costs are incurred on a per-case basis and scale directly with utilization.

Per-case costs and support requirements

Beyond capital and maintenance, traditional navigation systems introduce additional per-case costs that are not always immediately apparent. In many institutions, the use of navigation requires a dedicated navigation representative in the operating room. This role is separate from the instrumentation representative and represents an added cost to the hospital for each case.

The per-case cost associated with traditional navigation support can be similar to the per-case cost of NavJam. The distinction is not at the individual case level, but at the program level. Traditional navigation systems introduce substantial fixed costs, including capital purchase, annual maintenance contracts, and ongoing system support. NavJam avoids those fixed overhead costs by shifting navigation-related expense to a per-case instrument cost. When accuracy is preserved, this difference in cost structure meaningfully changes the financial equation.

Traditional navigation systems also require trained support personnel. While surgeons themselves may not require additional training, navigation representatives must be trained and certified, and that cost is ultimately passed on to the hospital. NavJam avoids much of this layered expense, further supporting its role as an alternative to traditional navigation.

Reliability and operational continuity

System reliability is an important and often underappreciated component of navigation economics. Traditional navigation systems are complex machines. When they are unavailable due to malfunction or service needs, cases may be delayed or canceled. Even brief periods of downtime can have outsized financial consequences, particularly in high-volume programs or ambulatory settings where schedules are tightly managed.

Because NavJam does not rely on a centralized navigation platform, it avoids this potential point of failure. From a practical standpoint, this helps preserve case continuity and protects revenue by reducing the risk of cancellations related to equipment availability.

Reimbursement pressures and sustainability

Navigation itself is generally not reimbursed as a separate line item. Hospitals must absorb the full cost of traditional navigation systems as part of the cost of doing business. With reimbursement continuing to decline, this reality forces careful consideration of how navigation is delivered.

NavJam offers a way to preserve the benefits of navigated access while reducing overhead. By avoiding large upfront investments and ongoing maintenance expenses, hospitals and ambulatory surgery centers can reach profitability more quickly and sustain spine programs without assuming additional financial risk. This distinction becomes increasingly important as more spine procedures migrate to outpatient settings, where margins are tighter and capital budgets are constrained.

Discussion

Navigation is no longer optional in contemporary spine surgery, but the way it is delivered is increasingly open to reconsideration. As clinical expectations rise and financial constraints tighten, there is growing interest in approaches that preserve the benefits traditionally associated with navigation while reducing the overhead and complexity that have accompanied large capital systems.

Alternatives to traditional navigation represent an important direction for the field. By rethinking how navigated access is achieved, these technologies have the potential to maintain accuracy and consistency while offering greater flexibility in how spine programs are built and sustained. As spine surgery continues to evolve, solutions that balance clinical confidence with economic sustainability will play a meaningful role in shaping its future.