Computer-Assisted Navigation for Orthopedic Procedure

Description

Computer-assisted navigation (CAN) in orthopedic procedures describes the use of computer-enabled tracking systems to facilitate alignment in a variety of surgical procedures, including fixation of fractures, ligament reconstruction, osteotomy, tumor resection, preparation of the bone for joint arthroplasty, and verification of the intended implant placement.

OBJECTIVE

The objective of this evidence review is to determine whether the use of computer-assisted navigation improves the net health outcome when used for orthopedic procedures, including ligament reconstruction, surgery for trauma or fracture, hip arthroplasty, periacetabular osteotomy, and total knee arthroplasty.

POLICY STATEMENT

Computer-assisted surgery for orthopedic procedures of the pelvis and appendicular skeleton is considered investigational.

BENEFIT APPLICATION

Experimental or investigational procedures, treatments, drugs, or devices are not covered (See General Exclusion Section of brochure).

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Reimbursement for the technical component of computer-assisted navigation may be sought through the use of the CPT codes or through hospital case rates.

**FDA REGULATORY STATUS**

Because CAN is a surgical information system in which the surgeon is only acting on the information that is provided by the navigation system, surgical navigation systems generally are subject only to 510(k) clearances from the U.S. Food and Drug Administration (FDA). As such, the FDA does not require data documenting the intermediate or final health outcomes associated with CAN. (In contrast, robotic procedures, in which the actual surgery is robotically performed, are subject to the more rigorous requirement of the premarket approval application process.)

A variety of surgical navigation procedures have been cleared for marketing by the FDA through the 510(k) process with broad labeled indications. For example, The OEC FluoroTrak 9800 plus is marketed for locating anatomic structures anywhere on the human body.

Several navigation systems (eg, PiGalileo™ Computer-Assisted Orthopedic Surgery System, PLUS Orthopedics; OrthoPilot Navigation System, Braun; Navitrack Navigation System, ORTHOsoft) have received the FDA clearance specifically for TKA. The FDA-cleared indications for the PiGalileo™ system are representative. This system "is intended to be used in computer-assisted orthopedic surgery to aid the surgeon with bone cuts and implant positioning during joint replacement. It provides information to the surgeon that is used to place surgical instruments during surgery using anatomical landmarks and other data specifically obtained intraoperatively (eg, ligament tension, limb alignment). Examples of some surgical procedures include but are not limited to:

- Total knee replacement supporting both bone referencing and ligament balancing techniques
- Minimally invasive total knee replacement."  

FDA product code: HAW.

In 2013, the VERASENSE™ Knee System (OrthoSensor) and the iASSIST™ Knee (Zimmer) were cleared for marketing by the FDA through the 510(k) process. FDA product codes: ONN, OLO.

Several computer-assisted navigation devices cleared by the FDA are listed in the table below.

**Table 1. Computer-assisted Navigation Devices Cleared by the U.S. Food and Drug Administration**

<table>
<thead>
<tr>
<th>Device</th>
<th>Manufacturer</th>
<th>Date Cleared</th>
<th>510(k) No.</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERASENSE for Zimmer Biomet Persona</td>
<td>OrthoSensor Inc.</td>
<td>6/7/2018</td>
<td>K180459</td>
<td>Computer-assisted Navigation for Orthopedic Surgery</td>
</tr>
<tr>
<td>NuVasive Next Generation NVM5 System</td>
<td>NUVASIVE INCORPORATED</td>
<td>3/16/2017</td>
<td>K162313</td>
<td>Computer-assisted Navigation for Orthopedic Surgery</td>
</tr>
<tr>
<td>JointPoint</td>
<td>JOINTPOINT INC.</td>
<td>8/3/2016</td>
<td>K160284</td>
<td>Computer-assisted Navigation for Orthopedic Surgery</td>
</tr>
<tr>
<td>EXACTECH GPS</td>
<td>BLUE ORTHO</td>
<td>7/13/2016</td>
<td>K152764</td>
<td>Computer-assisted Navigation for Orthopedic Surgery</td>
</tr>
</tbody>
</table>

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RATIONALE

Summary of Evidence

For individuals who are undergoing orthopedic surgery for trauma or fracture, ligament reconstruction, THA and periacetabular osteotomy, or TKA who receive CAN, the evidence includes RCTs and nonrandomized comparative studies. The relevant outcomes are symptoms, morbid events, and functional outcomes. Overall, the literature supports a decrease in the variability of alignment with CAN, particularly with respect to the number of outliers. Although some observational data have suggested that malalignment may increase the probability of early failure, recent RCTs with short- to mid-term follow-up have not shown improved clinical outcomes with CAN. Given the low short-term revision rates associated with conventional procedures and the inadequate power of the available studies to detect changes in function using CAN, studies are needed that assess health outcomes using CAN in a larger number of subjects with longer follow-up to permit greater certainty on the impact of this technology. The evidence is insufficient to determine the effects of the procedure on health outcomes.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

No guidelines or statements were identified.

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

REFERENCES


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POLICY HISTORY - THIS POLICY WAS APPROVED BY THE FEP® PHARMACY AND MEDICAL POLICY COMMITTEE ACCORDING TO THE HISTORY BELOW:

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2011</td>
<td>New Policy</td>
<td>Policy statement changed to “not medically necessary”.</td>
</tr>
<tr>
<td>June 2012</td>
<td>Replace Policy</td>
<td>Policy updated with literature search; references 6, 9, 14, 16, 19, 21-23, 25-27, and 32 added; policy statement unchanged.</td>
</tr>
<tr>
<td>September 2013</td>
<td>Replace Policy</td>
<td>Policy updated with literature review through November 7, 2016; references 7,12,21,24, 26 and 32 added; some references removed. Title changed to “Computer-Assisted Navigation for Orthopedic Procedure”. Policy statement unchanged except “not medically necessary” corrected to “investigational” due to FDA 510(k) clearance.</td>
</tr>
<tr>
<td>March 2017</td>
<td>Replace Policy</td>
<td>Policy updated with literature review through February 5, 2018; no references added. Policy statement unchanged.</td>
</tr>
<tr>
<td>June 2018</td>
<td>Replace Policy</td>
<td>Policy updated with literature review through February 4, 2019; references added. Policy statement unchanged.</td>
</tr>
<tr>
<td>June 2019</td>
<td>Replace Policy</td>
<td>Policy updated with literature review through February 4, 2019; references added. Policy statement unchanged.</td>
</tr>
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