How-to-do-it

Pacemaker dependent patients with device infection—a modified approach

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Abstract

A modified surgical concept for temporary cardiac pacing in pacemaker dependent patients requiring total removal of infected devices is presented. Proximal to the infected pocket a permanent bipolar pacing lead is placed transcutaneously into the ipsilateral subclavian or jugular vein. The lead is placed in the right ventricle and fixed into the skin using the suture sleeve. Pacing is established by connecting an external pacing generator. Subsequently the infected device can be removed completely. After wound dressing the externalized lead is connected to a permanent VVI-pacemaker allowing for prolonged temporary pacing.

Keywords: Temporary pacing; Infection; Pacemaker

1. Introduction

Management of infections involving cardiac implantable electronic devices (CIED) is challenging. In the small subset of pacemaker dependent patients perioperative strategies are even more demanding. Complete removal of all foreign material is mandatory. Surgical concepts include the establishment of temporary transvenous pacing by using conventional temporary pacing leads, simultaneous implantation of a new permanent rhythm device at the opposite side or an epicardial approach.

A staged concept with intermediate temporary pacing is advantageous to allow for full recovery from infection, complete and specific antibiotic treatment and no risk of germ transfer. However, conventional temporary pacing is associated with significant complications as lead dislocation, infection and right ventricular perforation, respectively [1-3]. We present a new technique for temporary cardiac pacing allowing for full patient recovery and subsequent implantation of a new CIED under optimized conditions.

2. Surgical technique

The chest is sterilely draped. Proximal and remote to the infected pocket the ipsilateral subclavian or internal jugular vein is punctured transcutaneously. A permanent bipolar active-fixation pacing lead is introduced into the vein using a peel-away introducer sheath and Seldinger technique. Active-fixation leads are preferred due to the resistance to subsequent lead extraction manoeuvres. The lead is placed in the right ventricle meeting standard pace/sense criteria and is fixed into the skin by using the suture sleeve (Fig. 1a). Intermittent pacing is established by connecting an external pacing generator and the lead is covered by a surgical plastic wrap. Now the infected wound is opened and the device can be completely removed using technical support including extraction sheaths or locking stylets as appropriate (Fig. 1b). Surgery includes removal of all foreign material, debridement of the inflammatory tissue and closed wound drainage. After closure (Fig. 1c) and dressing of the septic wound the new lead is disconnected from the external pacing generator under non-sterile conditions and connected to a desinfected second-hand permanent pacemaker device to allow for prolonged temporary VVI pacing (Fig. 1d). The pacemaker can also be attached to the skin by adhesive dressing. The daily dressing includes the wound and the lead insertion area while the pacemaker device is fixed unsterilely at site. After subsequent implantation of a new permanent rhythm device the permanent active-fixation lead can be easily removed percutaneously under fluoroscopic control.

3. Results

Between 07/2001 and 09/2004 the described surgical strategy was applied in 10 consecutive patients with pacemaker dependency and severe device infection. All patients fulfilled mandatory indications for lead removal presenting...
with septicaemia and extravascular tissue infection (criteria II-IV, 3). Patient’s age was 68.5 ± 15.3 years, 60% were female, 20% diabetics. Six patients presented with an infected pacemaker and 4 patients with an infected ICD (Fig. 2). Sixty percent were early infections (within 10-35 days) and 40% were late infections (304-852 days). Every patient was informed about the surgical concept. Surgical alternatives and the risks of temporary pacing were also explained in detail. Every patient gave his informed-consent to this strategy.

Explantation was performed under local anesthesia in 80%. In two patients with late infections a lead locking stylet (CleARS™, Spectranetics International, Colorado Springs) for complete lead removal was required. Perioperative course was uneventful, mean postoperative ICU stay was 2.2 days. After routine pacemaker check patients were transferred to the regular ward without routine ECG monitoring. After adjusted antibiotic treatment and wound healing a new device was implanted on the opposite side 13.5 ± 10.5 days (range 8-36) post explantation. Patient acceptance was excellent. Postoperative course was uneventful in all patients. In repeated follow-up examinations no recurrence of infection was observed either on the abandoned nor on the implantation side.

4. Comments

Reports on the detailed pacing strategy in patients without sufficient spontaneous cardiac rhythm and device infection are rare. Klug et al. [4] prefer simultaneous epicardial implantation of a new device in these patients, others describe a prolonged pacing using the exteriorized old permanent lead for temporary pacing [5,6] or conventional
temporary pacing systems [7]. All these approaches are
associated with significant risks.

The presented modified concept is advantageous because
an epicardial approach can be avoided and all infected
material can be initially removed allowing for primary wound
healing and routine subsequent CIED implantation at a site
without previous instrumentation.

Lead displacements as well as infections are well known
complications even for active-fixation temporary pacing
leads, therefore these patients require monitoring on special
care units [7]. The function of the externalized permanent
pacemaker system as described above is supposed to be as
safe as internal permanent pacemakers. Therefore, these
patients can be transferred to the regular ward without
specific monitoring and can be ambulated freely during this
period. The adequate pacemaker function can be comfort-
tably controlled by routine follow-up using standard pace-
maker programmer.

Because a direct wound contact was excluded, a
preoperatively checked second-hand VVI-R pacemaker
device could be used in all patients after routine antisepsis.

Finding no signs of lead infection, dislodgement or
dysfunction we conclude that the present modified strategy
for prolonged temporary pacing is a safe and cost-effective
approach for infected CIEDs in pacemaker dependent
patients.

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