A risk on an unprecedented scale in pacemaker implantation: prolonged waiting periods for urgent pacing indications

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This editorial refers to ‘Waiting for a pacemaker: is it dangerous?’ by B. Risgaard et al., on page 975

Short- and long-term complication rates of pacemaker implantation are well known. In several European countries, quality assurance systems or nation-wide registries are used to monitor pacemaker implantation quality of their health care providers. For patients who urgently require pacing therapy, the outcome may not only depend on the quality of the implantation process itself, but also on the waiting period elapsed until the pacemaker is implanted. This period may vary significantly between hospitals as well as between different health care systems. Data on the length of waiting periods and their influence on patient outcome are sparse.

In this issue of the journal, Risgaard et al. retrospectively reviewed waiting periods for urgent pacemaker implantation and the dependency of patient outcome on the length of a waiting period. It is important to mention that the study took place at a regional pacemaker centre in Denmark which receives patients from several smaller hospitals that are not able to apply temporary or permanent cardiac pacing. For logistical reasons, e.g. lack of implantation capacity, a mean waiting period of 4.5 days elapsed between the initial indication for pacing therapy and non-elective pacemaker implantation, and most patients were monitored at primary care hospitals until implantation. Remarkably, adverse events including asystole, ventricular tachyarrhythmias, and particularly infections occurred in almost one-third of the patients waiting for pacemaker implantation. Three patients aged between 82 and 91 years (1.2% of the study group) even died from asystole and/or infections during the waiting period. Complications occurred significantly more frequent in patients with waiting periods exceeding 1 day after an indication for urgent pacemaker implantation. The presence of high-degree atrioventricular (AV) block and the use of catecholamine infusion to treat severe bradycardia were predictors of adverse outcome.

According to these results, waiting for an urgently needed pacemaker appears to be really dangerous. An obvious limitation of the present study may, however, impede such a general conclusion: the outcome between early and late pacemaker implantation was not compared prospectively, but by subgroup analysis. Thus, a part of the entire study group consisting of patients who were implanted within 24 h was used as a control for the remaining patients. This comparison may have been biased by selecting younger and less critically ill patients for early implantation.

The centralized structure of the health care systems surely has influenced the result of the present study. Complications attributable to inability of temporary cardiac pacing like asystole or ventricular tachyarrhythmias would have been lower in medical care systems with either a higher cardiologic experience in the local hospitals or a sufficient capacity for patient monitoring in the pacemaker centre. However, the dependency of adverse events on the length of the waiting period is further supported by another trial performed in the late 1990s in Southern Ontario, Canada. The authors compared the number of adverse events occurring in two hospitals with similar health care standards and pacemaker implantation rates, one of which had a dedicated procedure room available for pacemaker implantation. In this hospital, a shorter mean waiting period of 1.9 days compared to 4.5 days at the counterpart was associated with a considerable reduction in the incidence of adverse events from 33 to 8%. A subgroup of patients waiting longer than 6 days even showed an adverse event rate of 58%. It cannot be ruled out that these results are also biased by patient selection. Nevertheless, these data strongly support the conclusion that a waiting period markedly exceeding 24 h after non-elective pacemaker implantation poses a considerable risk to the patient.

Not surprisingly, patients with third degree AV block were at particularly high risk of sudden cardiac arrest and ventricular tachyarrhythmias. Administration of catecholamines can be used as a bridging therapy until temporary pacing is established. The

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results of the present study clearly indicate that this pharmaco-
logical bridging should be used as briefly as possible to avoid
serious adverse events. Thus, it is recommended to immediately
transfer patients dependent on heart rate support to a pacemaker
centre and to implant a permanent pacemaker as quick as possible.

Infection is another important adverse event occurring during a
prolonged waiting period, particularly in old patients or those with
multiple comorbidities. In the study by Risgaard et al.,2 almost 20%
of patients were affected by infections after a waiting period of 6 or
more days. Such infections may further protract the implantation
process. Immobilization and the need for a transurethral catheter
play a central pathophysiological role and should be reduced as
much as possible. Thus, elderly patients, patients with pacing de-
pendency, and those with comorbidities definitively benefit from
immediate pacemaker implantation. In these patients, a permanent
pacemaker should be implanted within 24 h after the indication for
pacing whenever possible.

The present study brings up a ‘painful’ subject. Is pacemaker im-
plantation for non-elective indications performed as soon as neces-
sary in all European countries, particularly in pacing-dependent
patients? It has certainly not been the case in the Danish region
analysed in the present study. However, long waiting periods for
urgent pacemaker implantation appear not to be a regional
problem. Data from a pacemaker centre in the UK showed that in
2006 only 54% of patients with an urgent pacemaker indication
were implanted within 48 h after confirmed pacemaker indication.4
Interestingly, this rate did not substantially differ from the UK regis-
try data in 1986.5

Certainly, it is unfair to consider long waiting periods to be a
particular problem of centralized health care systems. The Canad-
ian study6 clearly showed that the waiting period mainly depends
on the infrastructure and resources of the implanting hospital.
Data on waiting periods for non-elective pacemaker implantation
from other large Western European countries including France,
Germany, Italy or Spain are not yet available. One may expect a
shorter mean waiting period for urgent pacing in Germany
where permanent pacemaker implantation is performed in more
than 1000 institutions.5 However, a widespread infrastructure for
pacemaker implantation does not automatically mean short
waiting periods, since time delay between the indication and im-
plantation mainly depends on the structure of an individual
hospital. Furthermore, the potential reduction in time to implant-
ation of a pacemaker may be paid dearly by a higher rate of com-
plications in hospitals with low implantation volume.

The present study proves that long waiting periods are not only
economically inferior but also dangerous for the patients. Thus,
more attention has to be paid to this potential problem at the
very beginning of pacemaker therapy. Far more data on the
problem of waiting periods for non-elective pacemaker implant-
ation are mandatory. Furthermore, it seems reasonable to
include a recommendation for an upper limit of waiting period
for patients with pacing dependency in the upcoming European
guidelines for pacemaker therapy.

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