A novel, simplified approach to starting nasal CPAP therapy in OSA

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Summary

Background: Due to ever increasing referral rates, we have had to move the nasal CPAP induction program for patients with obstructive sleep apnoea (OSA) out of the sleep laboratories and into an outpatient setting. We report the effects this has had on patient outcomes.

Methods: The last 75 patients with OSA who had an overnight CPAP titration in the sleep laboratory (group 1) were compared with the first 75 coming to an afternoon clinic and set up on CPAP in groups, and who had their CPAP pressure determined from an algorithm (group 2). They were assessed at 1 and 11 months using the Epworth Sleepiness Score, compliance with CPAP (h/night), whether still using CPAP, and the number of clinic appointments required in the first 11 months.

Results: The two groups were similar at baseline. There were no differences in any of the outcome measures. ESS values fell from 14.6 to 5.0 and from 14.0 to 5.1 at 11 months in groups 1 and 2, respectively: compliance, 5.2 versus 5.1 h/night; clinic appointments, 1.75 versus 1.96; discontinuation rates at 1 month, 8% and 7%, and at 11 months, 25% and 21%.

Conclusions: Using these simple outcome measures, we have shown that using an outpatient-based approach, and CPAP pressure based on an algorithm, have not reduced the efficacy of our CPAP induction program for patients with OSA.

Introduction

Rising numbers of referrals to the Sleep Unit forced us to consider ways to increase the availability of diagnostic sleep laboratory spaces or accept ever increasing waiting times. Various authors have reported on home CPAP titrations, and recent evidence suggests that an overnight titration might not be necessary to achieve adequate control of obstructive sleep apnoea (OSA). We therefore designed an outpatient-based CPAP induction program, using algorithm-derived CPAP pressures for subsequent home use. A previous companion paper describes the rationale behind the use of an algorithm to set the CPAP pressure. This paper describes the long-term outcomes of changing the way we establish patients with OSA on CPAP, from our previous sleep laboratory-based approach, to this new outpatient-based system.

Methods

The presence of OSA was established by a one-night sleep study, recording body movement and heart
rate as markers of sleep disturbance, with arterial oxygen saturation measurements (SaO₂) and snoring as markers of respiratory impairment, and measurements of pulse transit time to differentiate obstructive from central apnoeas³ (Visi-Lab monitoring system, Stowood Scientific Systems, Oxford, UK).⁴ In addition, a video recording of the whole night is available to confirm that abnormalities seen on the tracings are due to OSA. The severity of OSA was quantified from the number of >4% falls in SaO₂/h of study and shown in Table 1 for the patients in this study. This predicts the severity of OSA symptoms, and its response to treatment, at least as well as any other index.⁴ Patients with OSA in our sleep unit are diary-booked for CPAP, following a sleep study and medical outpatient review, where the appropriateness of this therapy is established. They are given written information at this time, as well as a prescription for nasal steroids and anticholinergics to be used for five nights prior to admission. The waiting time varies between 2 and 4 months. Our previous system for establishing patients on nasal CPAP required patients to attend the ward at 7.30 p.m. They were met by one of the sleep nurses and introduced individually to nasal CPAP, which included a video covering most aspects of CPAP usage, including interviews with patients describing their experiences with this therapy. They were then fitted with an appropriate mask and given the opportunity to get used to the system, and ask any questions. The patients were then left to connect to an automatic titrating CPAP machine (Sunrise Horizon LT) later on in the evening at their chosen bedtime. This auto-titrating CPAP machine has been shown to establish similar pressures for subsequent usage compared to manual titration.⁵ During the overnight titration, the ordinary ward night nurses responded to emergency calls, but were not otherwise involved. The following morning, the sleep nurse and patient reviewed the sleep study together and discussed how the patient had got on overnight. In addition, the sleep nurse established the required CPAP pressure by reviewing the Visi-Lab tracings (which included the CPAP pressure) and prepared a fixed pressure machine set at this pressure, for the patient to take home. This pressure was usually the 95th centile, having allowed for any areas of artefact, such as ‘mask off’ periods. When the patient was confident with the equipment, he took it home, and was given a telephone number to call if there were any problems. This telephone helpline is in operation 9 a.m.–5 p.m. with an answerphone for out of hours messages, which are responded to the next working day. The patients were then seen 1 month later in the nurse-led follow up clinic to review progress. If all was well they were booked for an annual follow up clinic with instructions to contact the helpline if required. Simple problems are solved by telephone if possible, with the patients returning to clinic earlier if required.

The new system required patients to arrive on the ward at 1.30 p.m. where they are met by one or two specialist nurses. They then receive a similar

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Initial and follow up data (1 and 11 months) on patients with OSA going onto nasal CPAP, before (titration) and after introduction of the algorithm method of prescribing CPAP pressure.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Titration (n = 75)</td>
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<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Age at commencement of CPAP</td>
<td>49.7</td>
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<tr>
<td>Initial ESS</td>
<td>14.6</td>
</tr>
<tr>
<td>Initial &gt;4% SaO₂ dips/h</td>
<td>34.0</td>
</tr>
<tr>
<td>Prescribed CPAP pressure</td>
<td>9.5</td>
</tr>
<tr>
<td>ESS at 1 month follow up</td>
<td>7.2</td>
</tr>
<tr>
<td>Compliance at 1 month follow up (hours/night)</td>
<td>4.1</td>
</tr>
<tr>
<td>ESS at 11 month follow up</td>
<td>5.0</td>
</tr>
<tr>
<td>Compliance at 11 month follow up (hours/night)</td>
<td>5.2</td>
</tr>
<tr>
<td>Average number of appointments in the 11 month follow up period</td>
<td>1.75</td>
</tr>
<tr>
<td>Proportion</td>
<td>Proportion</td>
</tr>
<tr>
<td>Gave up during 1st month</td>
<td>6/75</td>
</tr>
<tr>
<td>Gave up during first 11 months*</td>
<td>19/75</td>
</tr>
</tbody>
</table>

*This figure includes any reason, e.g. going for surgery, trying a dental device, other life events and illnesses. In addition, anyone in whom we were unable to verify compliance we have assumed non-usage.
induction programme to the old system, but in a
group of three or four, although the actual mask
fitting is done individually. Again, once the nurse
and patient are confident with the apparatus, he
goes home with a fixed pressure machine set at a
pressure determined from an algorithm, based on
neck circumference and OSA severity (as measured
from the >4% SaO₂ dips/h during the diagnostic
sleep study). This is described in the companion
paper, although during the course of this study we
added 1 cmH₂O to the algorithm-derived pressure,
as we were anxious not to undertreat. Again, the
patients have access to the telephone helpline and
are then seen in the follow up clinic. All care
thereafter is identical to the previous system with
extra outpatient appointments only if problems
cannot be solved by telephone.

The last 75 patients undergoing the old system of
overnight hospital titration were followed at 1 and
11 months (group 1), and compared with the first 75
patients in the new system (group 2). This allowed
us to answer the simple question, ‘did changing
from our old system, to a simpler and less
expensive approach, reduce the success rate of
goinging patients onto nasal CPAP, as judged by take
up rates, Epworth Sleep Scores (ESS), and numbers
of clinic appointments during the first 11 months?’
The two groups were compared using unpaired T-
tests and Chi² as appropriate.

Results

Table 1 shows the baseline data for the two groups,
showing no significant differences in age, initial
sleepiness (ESS) or OSA severity (>4% SaO₂ dips/h).
The algorithm-derived CPAP pressure was higher
than the titration pressures by about the extra
1 cmH₂O we had arbitrarily added to try to avoid
undertreating. There are no significant differences
in our chosen endpoints at either 1 or 11 months.
Included in the figures for ‘giving up’ are patients
who stopped using CPAP for any reason, including
going for surgery, trying a dental device, and other
life events (such as illness or hospital admissions).
In addition, for anyone in whom we were unable to
verify compliance (e.g. they failed to come to
outpatient appointments or respond to telephone
calls) we also assumed non-usage.

Discussion

This simple study has shown that changing to an
outpatient-based system to initiate nCPAP therapy
for OSA has not reduced take up rates or compli-
ance, nor lessened the beneficial effects on the
ESS.

There is a problem with this study as we were not
able to run the two systems concurrently and had
to change over on a particular date. Although we
believe we were comparing similar populations, it
was not a randomised parallel study and therefore
there may have been differences between the
groups. Although our criteria for suggesting a trial
of nasal CPAP are broadly an ESS ≥10, and more
than 10 >4% SaO₂ dips/h, flexibility is allowed in
individual cases. However, the ESS and >4% dips/h
are very similar in the two groups. The initial ESS
figures, and those at 1 and 11 months, are also very
similar to those obtained in a randomised con-
trolled trial of nasal CPAP we performed 2 years
previously,6,7 suggesting no substantial drift in
prescribing thresholds. The figures for discontinua-
tion rates at 11 months are similar to other
published series.8,9

In addition, we have only looked at ESS as a
marker of successful therapy. Nasal CPAP has been
shown to lower blood pressure in patients with
OSA10,11 and we do not know if the falls were the
same in the two groups, although there are no
reasons to suspect a difference.

Adequacy of CPAP therapy could be ensured by
the routine use of autotitrating machines at home
for one or more nights, or as a subsequent check
after a period on an algorithm-derived pressure.
However, we put approximately 10 patients a week
on nCPAP and have not been able to purchase
enough autoCPAP machines for this clinical load.
The machines we do have are used more selectively
when there are specific problems such as non-
resolution of sleepiness, or discomfort with mask
and poor compliance figures.

We were initially concerned that patients would
not like being together for part of the CPAP
induction program. However, at an anecdotal level,
the reverse appears to be the case. The patients
give each other moral support and benefit from
meeting again at the follow up appointment.

Conclusions

In conclusion, our introduction of an outpatient
nasal CPAP programme, in response to increasing
referrals without commensurate increases in re-
sources, does not appear to have led to a
deterioration in our services, as assessed by the
outcome measures of ESS, CPAP compliance,
discontinuation rates, and the need for outpatient
appointments to solve problems. However, a parallel trial, perhaps with measurements of 24 h blood pressure as well, is required before the equivalence of the two approaches can be proven robustly.

References