Exercise training in bronchiectasis

Exercise training and inspiratory muscle training in patients with bronchiectasis

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Evidence for effectiveness of pulmonary rehabilitation in patients with bronchiectasis

Pulmonary rehabilitation is now recommended by many professional respiratory societies as the standard of care for patients with chronic lung disease.[1–3] This has occurred because well designed prospective randomised controlled trials using valid responsive and interpretable outcome measures have convinced clinicians of its effectiveness. Benefits of pulmonary rehabilitation include improved health related quality of life, increased functional exercise capacity, and reduced healthcare resource utilisation.[4–6] The key determinant of the success of rehabilitation, and the one best supported by clinical evidence, is exercise training.

A frequently encountered challenge in respiratory medicine is that of extending the clinical application of treatment modalities, for which evidence was derived from one clinical circumstance, to other circumstances or diagnostic categories. For example, we recognise that long term oxygen therapy is life extending for patients with stable severe chronic obstructive pulmonary disease (COPD) who have resting hypoxaemia, but still wrestle with the challenge of whether it should be provided for those with transient exercise or sleep hypoxaemia, or those with other diagnoses not involved in landmark multicentre clinical trials. Such decisions are made using a combination of scientific evidence and clinical judgement, the latter being a less well defined entity that includes knowledge, experience, and common sense.

The paper by Newall and colleagues[7] in this issue of *Thorax* obliges us to consider the evidence in favour of extending pulmonary rehabilitation to patients with bronchiectasis, a chronic suppurative lung disease often characterised by airflow obstruction and hyperinflation and associated with decreased health related quality of life and reduced functional exercise capacity. Two issues arise: (1) does a prescribed regimen of physical training produce improvements in physiological or clinical outcomes compared with no physical training, and (2) should such a programme include inspiratory muscle training (IMT)?

There are marked similarities in the disease manifestations of COPD and bronchiectasis, both having a primary pulmonary impairment and both having secondary peripheral muscle, nutritional and psychological impairments. Given the similarities in clinical outcomes of reduced ability and participation, it is not too far of a stretch to conclude that both conditions might benefit from an exercise rehabilitation programme.

In 1990 Foster and colleagues[8] published a report on pulmonary rehabilitation in lung diseases other than COPD in which seven patients with bronchiectasis were included in the 32 patients enrolled in an inpatient programme. The 6 minute walk distance in patients with bronchiectasis improved by approximately 72 metres, a distance comparable to that achieved by patients with COPD. Despite the small number of patients studied, the authors concluded that patients with diagnoses other than COPD can and do benefit from an inpatient multidisciplinary rehabilitation programme. In 2002 Bradley and colleagues[9] undertook a systematic review of physical training for bronchiectasis in which they wished to determine whether exercise training improved or prevented deterioration in physiological and clinical outcomes compared with no exercise. They identified three studies, one of which did not meet the inclusion criteria and two of which were in abstract form (both by the current author). Bradley concluded that there was a need for well designed, adequately powered, randomised controlled clinical trials to assess the net benefit of adherence to different forms of prescribed physical training in patients with bronchiectasis.

The study by Newall *et al* is therefore welcomed as one of only a few published trials in this area. They randomised 32 patients with idiopathic bronchiectasis into one of three groups: pulmonary rehabilitation plus inspiratory muscle training (PR-IMT), pulmonary rehabilitation plus sham IMT (PR-SHAM), and a control group. The rehabilitation patients all underwent 8 weeks of exercise training, attending for supervised outpatient sessions twice a week with a third session at home. Patients exercised for 45 minutes at 80% peak heart rate using a combination of cycle, treadmill, and stair climbing exercises.

The 23 patients randomised to exercise rehabilitation improved their constant power exercise endurance, measured using a treadmill, as well as their incremental shuttle walk test. No differences in peak oxygen uptake occurred, but there were significant increases in endurance exercise capacity, the magnitude of which was similar in the groups whose regimen included IMT and sham IMT. It would therefore appear that the first question has been answered, albeit in a small pilot sized trial—namely, that exercise training improves exercise capacity in patients with bronchiectasis.

The second question may be slightly more problematic depending on one's view of the merits of IMT, about which a great deal has been written since it was first seriously considered as a clinical modality in the 1980s. Although it has been suggested that IMT may be an important adjunct to pulmonary rehabilitation, many clinicians have refrained from including it in their rehabilitation programme as clinical trials and meta-analyses still differ on whether a modest improvement in inspiratory muscle pressure can be translated into meaningful clinical improvements.[10–13] Respiratory muscles are autotrained against the increased respiratory obstructive and elastic loads associated with airflow limitation and hyperinflation, respectively. It has been shown that training using alinear resistors, pressure threshold loads, or isocapnic hyperpnoea will improve test function, but it is necessary for such training to extend the impact on clinical outcomes beyond exercise alone for it to be routinely included.[14] There is evidence that IMT improves inspiratory muscle strength, dyspnoea, and exercise tolerance,[15] but these effects are more likely to be obvious in patients with markedly reducted inspiratory muscle strength.

In the study by Newall *et al*, both the PR-IMT and the PR-SHAM groups had small but similar improvements in respiratory muscle strength. The addition of IMT did not add to outcomes beyond this increase. It could be argued

that small sample size and only a modest baseline reduction of inspiratory muscle strength prevented a more conclusive answer but, as with COPD, many clinicians will regard these data as insufficient to warrant using IMT for patients with bronchiectasis. Indeed, a recent meta-analysis of IMT for patients with COPD by Geddes and colleagues[16] concluded that it was only effective when using targeted devices that control or provide a target for training intensity.

There are several unanswered issues regarding training for patients with bronchiectasis which mirror the challenges of training for patients with COPD. The intensity, frequency, and duration of training, as well as the optimal strategy for maintenance of benefit, are common to both conditions. Additional issues specific to rehabilitation of patients with bronchiectasis include the optimal approaches for secretion clearance and specific education self-management action plans. Such issues should attract further well designed trials among this population. Bronchiectasis is no longer as common a condition as it used to be, but it is still present and many clinicians will continue to enrol patients with bronchiectasis in pulmonary rehabilitation, modifying the programme to help them tackle the issues specific to their condition. We will also continue to do so, but with slightly more comfort following the evidence of effectiveness described by Newall and colleagues.

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TBNA in the evaluation of patients with lung cancer

Usefulness of transbronchial needle aspiration in evaluating patients with lung cancer

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There is a need to promote more widespread use of TBNA for evaluating NSCLC

Since the introduction of flexible bronchoscopes in 1968,[1] various ancillary related methods of sampling lung tissue have been developed to greatly expand the diagnostic capabilities of the procedure. Perhaps the most important innovation has been the development of needles with the ability to puncture the tracheobronchial wall, allowing the bronchoscopist to go beyond the barrier of the airways to obtain specimens from both hilar and mediastinal structures.

After the publication of Dr Ko-Pen Wang's initial experience with transbronchial needle aspiration (TBNA) in the 1980s,[2 3] it became clear that this technique had great potential in both the diagnosis and staging of lung cancer as well as other diseases. The only limiting requirement is that the lymph node must be in close contact with the airways, which is most frequently the case in patients with lung cancer. Despite numerous publications highlighting the safety and accuracy of this procedure, the technique is still underused by pulmonologists. Based on data compiled from Europe and the United States, it has been estimated that the percentage of pulmonologists using TBNA is between 11% and 30%.[4–6]

The three most often cited reasons for not performing TBNA are: (1) problems with the technique (30%); (2) a belief that TBNA is not useful (30%); and (3) the lack of on-site cytopathology to assess the adequacy of the specimen (14%).[7]

The belief that TBNA is not useful deserves further exploration. There appears to be confusion in the literature regarding the diagnostic accuracy of this procedure. There is uniform agreement that the specificity is high (approaching 100%) with very few false positives. However, the sensitivity varies greatly in the literature and is influenced by factors such as the size and location of the lymph nodes,[8 9] the type of needle used,[10] the number of aspirates performed,[11] the nature of the lesion,[12] the availability of immediate cytological assessment,[13] and the means of guidance.[14] The sensitivity of TBNA also depends on the skill of the operator, and even experienced bronchoscopists may be frustrated by discouraging results during their first attempts with TBNA where performance requires some technical knowledge that is not intuitive. Several studies have shown that the