Prone positioning does not improve survival of patients with acute respiratory failure

Synopsis


Question: Does prone positioning improve the survival of ventilated patients with acute lung injury or acute respiratory distress syndrome? Design: Randomised controlled trial, with concealed allocation and intention-to-treat analysis. Outcomes unblinded with 6 month follow up. Setting: Intensive care units in Italy and Switzerland. Patients: Three hundred and four patients receiving mechanical ventilation who met the American–European Conference Consensus criteria for acute lung injury or acute respiratory distress syndrome were considered eligible for the study. Exclusion criteria included: age < 16 years, evidence of cardiogenic pulmonary oedema, cerebral oedema or intracranial hypertension or clinical conditions that contraindicated the use of the prone position. Interventions: The prone positioning group (152 subjects) were kept continuously prone for at least 6 hours per day for a period of 10 days. The control group (152 subjects) were positioned in supine. Main outcome measures: The primary outcome was mortality rate at day 10, at discharge from intensive care unit, and at 6 months. Secondary outcomes included respiratory function at day 10 and complications such as pressure sores. Main results: Survival was similar in the two groups at each time point. By day 10, 32 of the 152 subjects in the prone group had died versus 38 of 152 subjects in the control group (relative risk of death 0.84, 95% CI 0.56 to 1.27). At discharge the relative risk of death was 1.05 (95%CI 0.84 to 1.32) and at 6 months was 1.06 (95% CI 0.88 to 1.28). At day 10, the prone group had greater improvements in respiratory function 18.4 unit greater improvement in PaO2:FiO2 ratio (95% CI 3.2 to 33.6). However, the prone group had a greater number of new or worsening pressure sores: group mean (SD) for the supine group was 1.9 (1.3) versus 2.7 (1.7) in the prone group. Conclusion: Prone positioning improves respiratory function, but not survival, in patients with acute lung injury or acute respiratory distress syndrome.

Commentary

Prone positioning, used as an intervention for acute respiratory distress syndrome and acute lung injury since the 1970s, has been shown to improve oxygenation and recruitment (ie opening of alveoli) in both animal and human models (Guerin et al 1999). The important question is whether these benefits translate into an actual decrease in mortality.

Although this study did not demonstrate a reduction in mortality a number of factors may have affected the results of this trial. During the period of the study, open-lung protective ventilation (involving a high end-expiratory pressure and a low tidal volume) was shown to reduce mortality by 22% (Acute Respiratory Distress Syndrome Network 2000) and was adopted worldwide. Protective ventilation was not in vogue at the conception of this study, illustrating the difficulty of conducting a large trial that includes all current management strategies. As well, post hoc analysis revealed lower mortality in the more critically ill patients positioned in prone, raising the possibility that a study utilising a less heterogeneous population may show more definite results. Finally, a longer period of prone positioning may have also show a significant change in mortality.

Gattinoni and colleagues conclude from this study that they would not recommend prone positioning as a routine intervention for patients with acute respiratory failure. However, this advice needs to be viewed with some caution, as the study had insufficient power to provide precise estimates of the relative risk of death. For example, the lower limit of the 95% CI for the relative risk at day 10 includes a reduction in the risk of death of > 40%; an effect that would be clinically significant. Given that significant improvements in oxygenation in the prone group occurred, and there was no difference between adverse events in the two groups, I would recommend continuing with prone positioning and await the results of a further trial.

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References


Aerobic exercise reduces blood pressure in both hypertensive and normotensive persons

Synopsis


**Questions:** Does aerobic exercise reduce blood pressure? If so, who responds, how large is the effect and what types of aerobic exercise are effective? 

**Data sources:** Studies were identified by searching MEDLINE and SPORTDiscus (1966-September 2001) and by a manual search of the reference lists of retrieved articles. 

**Study selection:** Studies were selected if they were randomised controlled trials (RCTs), had follow-up of at least two weeks, the only difference between experimental and control groups was aerobic physical activity, and the paper was published in English. 

**Data extraction:** Three reviewers independently extracted data on characteristics of participants, study design, intervention method and outcomes. Disagreements were resolved by consensus. 

**Statistical analysis:** A random effects model was used to pool the overall effect size for both systolic and diastolic blood pressure. The characteristics used for sub-group analyses included hypertensive status, ethnicity, study duration, study sample size, study design, baseline BMI, weight loss during trial, exercise type, exercise frequency and exercise intensity. 

**Main results:** Fifty-four RCTs met the selection criteria: 53 provided usable systolic blood pressure data and 50 provided usable diastolic blood pressure data. Systolic blood pressure decreased in 44 of 53 trials (20 statistically significant) and diastolic blood pressure decreased in 42 of 50 trials (16 statistically significant). The overall pooled net effect of aerobic exercise on systolic and diastolic blood pressure was -3.84 mmHg (95% CI -4.97 to 2.72 mmHg) and -2.58 mmHg (95% CI -3.35 to 1.81 mmHg). Reduced blood pressure was observed in all sub-groups. 

**Conclusions:** Aerobic exercise reduces blood pressure in hypertensive and normotensive persons and in those who are overweight or of normal weight. The type, frequency or intensity of aerobic exercise does not seem to influence outcome.

Commentary

Approximately three million adult Australians have hypertension. It is the single most common problem managed in general practice (AIHW 2002) and a major risk factor for cardiovascular disease, the most common cause of death amongst Australians. Although pharmacotherapy effectively reduces blood pressure in the hypertensive (AIHW 2002), it can be associated with deleterious side effects. Thus, the efficacies of lifestyle modifications such as increased levels of physical activity are of interest. 

This meta-analysis clearly demonstrates that aerobic exercise significantly reduces systolic and diastolic blood pressure in hypertensive and normotensive individuals. These beneficial effects were independent of changes in body weight. Sub-group analysis suggested the benefits occurred in all three of the ethnic groups studied.

The overall blood pressure lowering effect was 3.84 and 2.58 mm Hg for systolic and diastolic pressures respectively. Changes of this magnitude in the general population have important public health implications by virtue of their potential to reduce the incidence of cardiovascular disease in the community (AIHW 2002). However, their implications for the individual are likely to be more modest. Indeed, careful measurement technique would be critical to detecting changes of this magnitude in individuals.

It is of interest that the effects were apparent for different exercise modes and doses but the effect size was larger in studies of shorter duration and where the exercise intervention was supervised, suggesting that adherence is an important determinant of the benefits of this approach. It is also noteworthy that the participants in 51 of the 54 studies selected were sedentary at baseline. It follows that development of strategies to facilitate exercise adherence in individuals who are habitually inactive may be critical to the success of exercise interventions for the prevention and treatment of hypertension.

Physiotherapists working in primary and secondary prevention can and should play a major role in the promotion of aerobic exercise, thereby reducing the impact of hypertension and other chronic diseases. 

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Reference

For patients with tennis elbow, physiotherapy is superior to corticosteroid injections in the long term

Synopsis


Question: To compare the efficacy of corticosteroid injections, physiotherapy and a 'wait-and-see' policy for lateral epicondylitis. Design: Randomised controlled trial with three arms. Setting: Primary care, The Netherlands. Patients: One hundred and eighty-five patients with lateral elbow pain that increased with pressure on the lateral epicondyle and with resisted dorsiflexion of the wrist; aged 18-70 years. Interventions: The intervention period was 6 weeks. Patients allocated to the wait-and-see group visited their family doctor once and were encouraged to await further spontaneous improvement. Ergonomic advice was provided and paracetamol or NSAIDs were prescribed if necessary. Patients in the corticosteroid group received up to three injections and were asked to avoid pain-provoking activities. The physiotherapy group received nine treatments of pulsed ultrasound, deep friction massage, and a progressive exercise program. The physiotherapy group also received home exercise equipment and an instruction book. Outcomes: Outcomes were assessed at baseline, 3 weeks after randomisation, and at 6, 12, 26 and 52 weeks. Primary outcomes were general improvement (6-point scale: ‘completely recovered’ to ‘much worse’), severity of main complaints, pain during day and inconvenience, functional disability and overall elbow complaint severity (scored by assessor). Treatment was considered successful if the patient nominated that the condition had completely recovered or was much improved. Secondary outcomes were pain-free grip strength, maximum grip strength and pressure-pain threshold. Results: At 6 weeks, significant differences in favour of corticosteroid injections were seen for all outcomes. For example the success rates were: injections 92%; physiotherapy 47%; and wait-and-see 32%. By 12 weeks, there were no between-group differences. However, at 26 and 52 weeks, the physiotherapy group scored significantly better in nearly all outcome measures than the corticosteroid group. There were small non-significant differences in favour of the physiotherapy group compared with the wait-and-see group. Conclusion: For patients with lateral epicondylitis corticosteroid injections are more effective than physiotherapy and a wait-and-see policy in the short term (< 12 wks). In the long term, physiotherapy becomes the best option followed by a wait-and-see policy.

Commentary

This study shows that corticosteroid injections, though initially successful, have poor long-term effect while the opposite holds for physiotherapy. However, it should be recognised that physiotherapy was only slightly more favourable than no treatment. Success rates at one-year follow-up were 69%, 91% and 83% for injections, physiotherapy and the wait-and-see policy, respectively. As success rates in excess of 80% also have been shown at one-year follow-up for placebo or minimal interventions (Hay et al 1999), this study indicates that in the long term, corticosteroid injection might be less beneficial to the patient than leaving the condition to cure itself.

Incomplete understanding of pathophysiological mechanisms underlying lateral epicondylitis has hampered development of effective therapeutic interventions. The numerous regimes included in the physiotherapy approach make it difficult to determine the relative contribution of each regime. There is little evidence for the efficacy of ultrasound and progressive exercise has been found superior to pulsed ultrasound. More selective and optimal physiotherapy interventions need to be disclosed, particularly for short-term effects.

A recent study of histological, immunohistochemical, and electron microscopy findings in tennis elbow showed no signs of inflammation (Kraushaar and Nirschl 1999). Instead, there were indications of incomplete or halted repair processes with signs of disorganised, immature or failed vascular and collagen remodelling (ie tendinosis). This suggests the need for a revised theoretical background when designing efficacy studies for lateral epicondylitis. If tendinosis is the pathology that causes lateral epicondylitis, treatments aimed at restarting the healing process (eg needling or forceful deep friction massage) may be promising. It is conceivable that concurrent controlled exercises will provide tensile loads necessary for adequate collagenous remodelling (Kraushaar and Nirschl 1999).

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References


Manual therapy produces greater relief of neck pain than physiotherapy or general practitioner care

Synopsis


Question: Which treatment is more effective for neck pain: manual therapy, physical therapy or general practitioner (GP) care? Design: Randomised controlled trial, with concealed allocation. Setting: The Netherlands. Patients: One hundred and eighty-three neck pain patients aged 18-70 years. Inclusion criteria were: neck pain or stiffness for at least 2 weeks, neck symptoms reproduced during physical examination and no manual or physical therapy treatment of neck in previous 6 months. One patient was lost to follow-up at 7 weeks. Interventions: Sixty patients were allocated to manual therapy, 59 to physical therapy and 64 to general practitioner care. Manual therapy comprised up to six 1hr treatments that could include muscular and specific articular mobilisation techniques plus co-ordination or stabilisation exercises but excluded high velocity thrust techniques. Physiotherapy comprised up to twelve 30min sessions of active exercise. Manual stretching/traction, massage and modalities could precede the exercise. The GP group received standardised care that could include advice, education and medication. Outcomes: Primary outcomes were: 1) ‘successful treatment’ defined as patient describing their condition as completely recovered or much improved (patient offered 6 response options ranging from much worse to completely recovered); 2) researcher’s rating of physical dysfunction (range 0 = no physical dysfunction, 10 = maximal dysfunction); 3) bothersomeness of pain, average pain and most severe pain each measured on a 0-10 scale; and 4) disability measured with the Neck Disability Index (range 0 = no disability, 50 = maximum disability). Length of follow-up was 7 weeks, outcomes were measured blind and analysed according to the intention-to-treat principle. Result: At 7 weeks, a statistically significantly greater proportion of subjects in the manual therapy group (68%) had a successful outcome than in the physiotherapy group (51%) or GP group (36%). The manual therapy group had greater improvements than the GP group for physical function (between-group difference and 95% CI 1.7 units (0.9 to 2.5)) and for all three pain measures, (eg bothersomeness of pain, 1.5 units (0.4 to 3.5)) but not for disability 1.9 points (-0.3 to 4.1). The comparisons of manual therapy versus physical therapy and physical therapy versus GP yielded between-group differences that were typically small and/or not statistically significant. Conclusion: Neck pain patients receiving manual therapy are more likely to report that their condition has resolved or greatly improved than those receiving physiotherapy (where manual therapy is not permitted) or general practitioner care.

Commentary 1

Two consultations from a GP provide barely enough time to assess the patient and write a prescription. One can wonder then, just how concerted and just how convincing was the “advice on prognosis, advice on psychosocial issues, advice on ergonomics, and encouragement to await further recovery”, as conducted in the current study.

A cynical interpretation of the results of this study can be that manual therapy is better than suboptimal care for neck pain by GPs. This, however, is not tantamount to evidence that manual therapy “works”. It only works better than mediocre usual care. A more challenging test would have been one in which GPs provided a more concerted intervention over three or six times the number of consultations. Nevertheless, the study reveals that, in reality, manual therapy is better than what GPs currently offer.

However, the improvements in pain, disability, and quality of life were quite modest. The conclusions rely largely on the so-called “success” rates. These figures were defined as a composite of patients “fully recovered” and “much improved”, but they were used to imply “complete recovery”. The study did not provide a breakdown of fully recovered and much improved. This subjective measure did not impress the authors of the accompanying editorial (Posner and Glew 2002).

Doubtless, proponents of manual therapy will herald this study as evidence positive of their intervention. As a consumer, I lament that the outcomes were reported only at seven weeks, which renders the report essentially meaningless. The thesis is more revealing (Hoving 2001). At 13 weeks the outcomes asymptote, and by 52 weeks significant differences disappear. So, before manual therapists contend that they have a panacea, they should recognise that, at best, they have an intervention that gets a proportion of patients (but far from all) better sooner. At worst, it may be no great call to fame to be better than suboptimal care by GPs constrained to less than a handful of 20 minute consultations.

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References


Commentary 2

This study compared a 6-week program of manual therapy, physical therapy and continued GP care for patients with acute/chronic and recurrent neck pain. The results add to evidence of the efficacy of manual therapy, with superior immediate post-treatment effects for manual therapy over physical therapy and continuing GP care. Long-term treatment effects were not provided in this report.

To place these interventions in the Australian context, distinction is made in Holland between physiotherapists with additional training in manual therapy (manual therapists), and those without (physiotherapists). The manual therapy intervention, which was inclusive of low velocity joint mobilisation and specific co-ordination and stabilisation exercises, better reflects standard physiotherapy practice in Australia. Manual therapy is taught as an integral part of usual practice in all Australian undergraduate programs.

This trial demonstrated that general strength and mobility exercises (physiotherapy) and general advice on activity and assurance (GP care) are not as effective as a more specific, multimodal physiotherapy program inclusive of manual therapy. The primary outcome was “treatment success”; the patient reporting complete recovery or much improvement. Treatment success occurred for 68.3% of subjects receiving manual therapy compared with 50.8% of subjects receiving physiotherapy and 35.9% of subjects receiving GP care. For every three patients treated with manual therapy, rather than GP care, one additional patient will have a successful outcome. The GP and physiotherapy patient groups had more days off work than the manual therapy group, and patients under GP care continued with a high medication intake.

The disability and physical dysfunction outcomes displayed smaller between-group differences than were seen with the primary outcome. The authors attributed this to the potential lower sensitivity to change of these measures. Another factor to consider is treatment dosage (six manual therapy interventions in six weeks). Is this sufficient to achieve change, especially in muscle function? Several outcome measures were on a slope of continued improvement at follow-up assessment. Would more treatment produce better outcomes? Optimal dosage of physiotherapy treatment in the context of cost effectiveness is a critical area for future research to ensure that best outcomes are achieved.

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