



HAUTE AUTORITÉ DE SANTÉ

**ANALYSIS OF STATIC AND/OR DYNAMIC POSTURE ON
A FORCE PLATFORM (POSTUROGRAPHY)**

COMPUTER-ASSISTED STATOKINESIGRAPHY

June 2007

Department of Medical and Surgical Procedures Assessment

THE TEAM

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SUMMARY

INTRODUCTION

- The request for an assessment of the procedure "Analysis of static and/or dynamic posture on a force platform (posturography), *Computer-assisted statokinesigraphy*" was made by UNCAM [French state health insurance body] and SOFMER (Société française de médecine physique et de réadaptation) [French society of physical medicine and rehabilitation] with a view to including it on the list of procedures covered by health insurance.

- The Haute Autorité de Santé has assessed the expected benefits of this procedure in order to form an opinion as to whether it should be added to this list.

CONTEXT

- medical context

The purpose of static or dynamic posturography is to study balance-regulating mechanisms by examining the trajectory of centres of pressure (statokinesigram). This technique uses force platforms fitted with multiple sensors allowing the distribution of body weight on the force platform to be measured over time. Each sensor supports a part of the body weight and so measures the force applied to it.

Dynamic force platforms cause the patient to lose his or her balance and analyses his or her ability to retrieve his or her balance by conducting a series of varied tests reproducing the complex situations which the patient may experience in everyday life.

Balance disorders may be caused by numerous pathologies, including vestibular and cerebellar disorders and forms of ataxia. A German survey found that vestibular vertigo was widespread, with annual prevalence and incidence figures of 5.2% and 1.5% respectively. European epidemiological studies have shown the prevalence of hereditary forms of ataxia ranging from 1.6 to 9.3 cases per 100,000 inhabitants.

Finally, about one person in three over the age of 65 has at least one fall a year. Falls among the elderly have severe consequences in terms of morbidity and mortality. One person in five who falls after the age of 65 for reasons connected with balance dies in the year following the fall (this represents 9,000 deaths a year). Falls are serious not only because of their traumatic consequences but also because of their psychomotor and psychological consequences, which include post-fall syndrome (phobia of falling and geriatric deconditioning syndrome). These consequences aggravate loss of autonomy and social isolation, making it more likely that individuals affected will be institutionalised. Almost a million elderly people no longer leave their homes after a fall.

- nomenclatures:

The procedure is not listed in the Common Classification Of Medical Procedures tariff schedule. It has been identified in the American nomenclature.

ASSESSMENT

The method proposed by HAS for assessing the expected clinical benefit of medical or surgical procedures is based on the scientific data found in the literature and on the opinion of a working group of healthcare professionals.

Critical analysis of literature data

Publications examined

A documentary review with no time limit was conducted through a search of the principal medical literature databases (*Medline*, *The Cochrane Library*, *National guideline clearinghouse* and *HTA Database*). One hundred and seventy-seven documents were obtained, 31 quoted, of which 15 were analysed.

Only studies meeting the following criteria were selected and analysed:

- studies assessing diagnostic performance: one meta-analysis;
- studies assessing technical performance: five reproducibility studies;
- evaluation studies: five quantitative deficit evaluation studies, and four studies evaluating the efficacy of treatment and/or re-education.

Indications

- quantitative evaluation of balance and posture disorders, particularly among patients suffering from vestibular and neurological disorders and among elderly patients with a view to providing therapy for balance disorders and to prevent falls;
- evaluation of the benefit obtained from various therapeutic procedures in the balance of disabled people.

Efficacy

- Reproducibility studies (number of patients: $n = 235$) show that reproducibility varies according to the sensory conditions under which the test is conducted; on average it is good (0.64 – 0.70) except when visual stimuli are disturbed with the patient's eyes open and a mobile screen. Inter-observer reproducibility is comparable when the test conditions are the same. The reproducibility of parameters is better on the second and third days of a three-day test session (0.69 to 0.91); repeating tests triggers a learning effect which increases when tests are conducted at shorter intervals. This aspect should therefore be borne in mind when interpreting the results. Intra-subject variability of the various parameters was examined: the greatest consistency was observed for speed in the anteroposterior direction, and this was highly sensitive to sight deprivation.

- A meta-analysis showed that posturography did not provide any additional information compared to a standard vestibular examination in patients with Ménière's disease, forms of benign paroxysmal positional vertigo or peripheral vestibular deficits (vestibular neuronitis, paralytic vertigo) but that it did provide more information than the standard tests when attempting to detect deficits related to vestibular dysfunction in patients with central nervous system disorders.

- Evaluation studies ($n = 671$) showed that a dynamic translation platform was better than conventional static methods for differentiating balance problems related to age and disorders related to pathologies in elderly subjects. The aim of an objective evaluation of balance in elderly subjects and people suffering from certain conditions is to analyse postural abnormalities and the risks of falling. It allows the practitioner to quantify the balance deficit and subsequently to evaluate the efficacy of a particular treatment and/or re-education programmes.

Safety

No incidents or complications have been identified in the literature.

Role within the diagnostic and therapeutic strategy:

Computer-assisted statokinesigraphy is a complement to questioning the patient and performing a rigorous clinical examination, and to other conventional tests which produce quantitative clinical scores.

Computer-assisted posturography quantifies the balance disorder and documents each of the sensory components (proprioceptive, visual, vestibular) which help maintain postural stability.

Conditions of use

A physical medicine and rehabilitation reference guideline describes how posture and balance analysis should be performed and what equipment is needed.

Impact on the general population, health care system and public health programmes

No studies have been identified in the literature.

Position of the working group

Indications

The group of experts emphasises that posturography is designed to quantify balance disorders. It is not useful for diagnosing pathologies, but helps distinguish the organic pathologies involved in balance disorders. It is an evaluation instrument that helps practitioners determine the best therapy and monitor their patients. It is therefore part of the therapeutic approach.

Pathologies/populations treated

The working group agrees with the pathologies described in the dossier (vestibular and cerebellar disorders, forms of ataxia, etc.) and adds to them hemiplegia, cerebrovascular accident, neuropathies and multiple sclerosis. It also points out that many rare diseases involve balance disorders.

With regard to falls, one expert said that the predictive value of the test (three tests, conditions 5 and 6) had been demonstrated for elderly people when there had been no learning effect. The study in question was added to the dossier.

Efficacy

The working group accepts the reproducibility and efficacy criteria described in the dossier.

Safety

There is some risk of falling, and therefore the examination must be carried out under appropriate conditions. For serious disorders such as ataxia, a harness or safety belt should be used and it might be beneficial to have a third person present.

Role in treatment strategy

Computer-assisted statokinesigraphy is a complement to questioning the patient and performing a rigorous clinical examination, and to other conventional tests which produce quantitative clinical scores. The group emphasised that posturography should only be carried out if necessary in the light of a clear problem, and that therefore it will be offered to a small number of patients.

Impact on public health

It is difficult to quantify the impact. However, the cost to geriatric medicine will be not inconsiderable.

Training required

Either basic training in physical medicine, rehabilitation and ENT as part of the third cycle of an undergraduate medicine course, or additional training leading to a specific inter-university diploma (clinical posturology).

Environment required

The group agrees with the environment described in the reference guide available in physical medicine and re-education practices. However, it emphasised that the room must be sound-proofed.

The examination is multidisciplinary and involves a number of specialists, including an ENT specialist and a neurologist. Patients should not be examined more than twice a year.

Estimated target population

It is difficult to estimate the number of patients in view of the geriatric population. Centres are currently saturated. However, experts estimate the number of patients with genuine, progressing pathologies (excluding elderly people) at 100,000.

Conclusions of the working group

The group agreed to approve listing of the procedure with a sufficient (SA).

Target population

- Data from the literature:

So many pathologies exist, at varying degrees of severity that it is impossible to produce an accurate estimate of the number of patients affected by the procedures.

- Data provided by professionals:

It is difficult to estimate the number of patients in view of the geriatric population. However, experts estimate the number of patients with genuine, progressing pathologies (excluding elderly people) at 100,000.

CONCLUSION

Therapeutic benefit

Computer-assisted posturography quantifies the balance disorder, documents each of the sensory components (proprioceptive, visual, vestibular) which help maintain postural stability, and analyses postural abnormalities and the risks of falling.

This evaluation, to be conducted only on individuals with serious pathologies and progressive disorders, is essential to allow the practitioner to make the best therapeutic choice and to evaluate the efficacy of treatments and/or re-education programmes.

Public health benefit

No study of the impact on public health was identified.

The disabilities caused by the handicap take the form of pain, restricted activity, reduced mobility leading to difficulties at work, loss of autonomy and risk of falling.

In the light of this data, the expected benefit (EB) is regarded as sufficient.

The improvement in expected benefit (IEB) is regarded as minor (IV) in view of:

- the usefulness of the procedure in quantifying the balance deficit to help the practitioner decide on the best therapy and to objectively assess the efficacy of treatments;
- the severity of the pathologies under examination.