Another problem is the patients' psychological reactions to his injury. The patient and his family members need to cope with a new situation and in many cases with altered appearance and intellect. Especially during the first months at home, the family members tend to be rather overprotective.

Present rehabilitation programs are based on the assumption that a relatively brief intensive intervention leads to lasting functional changes. One way of providing intensive treatment for large numbers of patients is to concentrate them in centrally located clinics as in-patients. The problems of carrying over to the natural environment are solved by a domiciliary visit from the rehabilitation team and brief visits home by the patients, mainly at weekends.

The present study reveals the shortcomings of this type of rehabilitation program. Better continuity and follow-up in the home situation, both during the hospital stay and after discharge would be of value. We have suggested that apraxia signs may have a disrupting effect on maintaining ADL skills. If the suggestion is supported in further studies, then treatment models providing for the possibility of intermittent treatment to maintain long-term independence should be considered.

REFERENCES

Address for offprints: Eil Bjørnæs

Ergoterapeutisk skolen i Trondheim
Prenters gate 8 B
N-7000 Trondheim, Norway

The purpose of massage is to prevent and treat pressure sores. The massage method is deeply rooted in practice and 45 of 66 words used the linear massage method in 1980 (2). Massage is supposed to stimulate local skin blood flow and is used in areas at risk for pressure sores (1, 7).

Ryan (8) describes the aged skin as atrophic due to less vascularization in the papillae and a decreased total vascularization in the dermis. The results of the present study on skin blood flow indicated an impaired ability of older in-patients to increase skin blood flow in response to thermal stimulus. The ability to increase blood flow in response to thermal stimulus seems to weaken with age and inactivity (3). The aged skin can grow new capillaries when it is stimulated, for example after an injury during the process of healing (8). Does massage give a temporary effect with increased skin blood flow? Does massage stimulate enough to give a long-term effect with an increased capability of responding to thermal stimuli? Does the skin with symptoms of ischaemic injury react in the same way after massage as normal skin?

The purpose of this investigation was to study the effect of massage on the local skin blood flow in normal skin and in skin with discolouration in areas at risk for pressure sores.

MATERIALS AND METHODS
In this study massage of the skin means small circular movements with the fingertips from the periphery to the centre for 3 min with liniment in an area of 10 cm². In this study skin discoloration means red or reddish blue coloured skin after prolonged pressure causing ischaemia for 30 min after relief of pressure.

GROUP A
The patients, 7 women and 3 men older than 60 years of age, with normal skin over the lateral part of the left hip (treatment area) and over the ventral part of the left thigh (control area) were measured for 20 days each. The 20 day period was divided into 5 days before and 5 days after a 10 day period of massage implemented twice a day, in the morning and in the evening. The measurement before and after were done at ambient temperature (20-24°C) and at increased temperature (40°C) on treatment area and control area. For the 10 day period of massage on treatment area the measurements were made before and after the massage was implemented in the morning. The patients suffered from cerebral haemorrhage, senile dementia, rheumatoid arthritis, arteriosclerosis, diabetes mellitus and Parkinson's disease.

GROUP B
Thirteen patients, 15 women and 14 men, with cerebral haemorrhage and with normal skin over the lateral part of the hip on both sides had blood flow measurements on two successive days. Blood flow was measured bilaterally first in the basil and then after 10 min of stasis. After a 30 min pulse the "basal" measurement was repeated. Following this measurement was carried out the
blood flow measurements began immediately after the completion of massage and continued for 5 min. Seventeen patients had hemiplegia on the left and 12 on the right. Nineteen patients had total hemiplegia and 10 had partial. Eleven of the patients had had their hemiplegia less than one year. Twenty patients were measured in the morning and 9 one hour after lunch with at least 30 min bedrest before any measurements were made.

Group C
Fifteen patients, 7 women and 8 men, with skin discoloration were measured once before and after the massage was implemented. The measurements were made at the centre of the area of the injured skin 30 min after relief from pressure and on normal skin about 10 cm from the edge of the discoloration. The discolorations were situated on the lateral part of the hip, ischiatic tuberosity, sacrum, or on the calcaneal tuberosity. The patients suffered from cerebral haemorrhage, senile dementia, arthrosis, diabetis mellitus, rheumatoid arthritis, Parkinson’s disease, fracture or tetraplegia.

The skin blood flow was measured with the laser Doppler flowmeter equipped with a thermostatic probe holder (5 cm) to permit measurement during thermal stimulus (26 to 40°C). In group A a prototype MK V VMT 606 Serial 07 with full scale 5 V was used. In groups B and C a Perthe 14 with full scale 10 V was used (Perthe, Stockholm, Sweden). Laser Doppler flowmetry is a noninvasive technique that measures the velocity of moving red cells to a depth of approximately 1 mm. This technique gives a measure in millivolts which is linearly related to blood flow (10). The skin temperature and the ambient temperature were measured with a thermostatic temperature probe (Yellow Springs Instrument Co., Yellow Springs, Ohio). Additional measurements were body temperature and blood pressure. In group A, blood pressure and body temperature were measured in the 5 day periods before and after the massage period. The massage was given within each group by one and the same individual who was trained in the massage technique.

The characteristic of the patients in groups A, B and C are shown in Table 1.

The effect of the stimuli on the skin blood flow was calculated from the maximum blood flow. Statistical methods used in this study are arithmetic mean, standard deviation, regression analysis, Student’s t test, Wilcoxon test and chi-square test. When more than one measurement has been made per variable the mean obtained from the measures is the basis for the calculations.

RESULT
Regression analysis indicates a significant positive correlation between skin temperature and basal skin blood flow in the treatment area (p<0.01), a negative correlation between mean arterial pressure and basal blood flow in the skin blood area (p<0.05) and the control area (p<0.01) in group A (Table 1). A significant positive correlation between the variables body temperature (p<0.05), mean arterial pressure (p<0.01) and the changes in skin blood flow in response to thermal stimulus and between skin temperature before the massage and the changes in skin blood flow in response to the massage (p<0.05) were found in group A (Table 1). A significant negative correlation was found between mean arterial pressure and the changes in skin blood flow in response to massage in subgroup 3 in group B on the left side of the body (p<0.05) (Table 1, Fig. 4).

Fig. 1. The recorded blood flow values in millivolts in normal skin over the lateral part of the hip before and after the massage measured with a laser Doppler flowmeter in group A (M±SD). The values are calculated from ten measurements each except patient number 6 which are based on 9.

Group A
For four of the patients there was an increase in the skin blood flow recorded 1.3±0.4 min after the massage was implemented, the mean of the differences was 46.2±31.4 mV (Fig.1). The six patients had either unchanged blood flow or slightly increased or decreased changes recorded after 0.5±0.4 min. These six patients suffered from cerebro haemorrhage and senile dementia. The patients with senile dementia were on no medications while the other patients were. One woman with senile dementia had no recorded increase in her skin blood flow nine days of ten with massage but day number two in the massage period an increase in the skin blood flow of 866% was recorded.

To investigate the long-term effect of the massage, the measurements at ambient temperature and with thermal stimulus five days before and five days after a ten day period of massage were compared both on the treatment area and on the control area. The results indicated no changes in the skin blood flow at ambient temperature and no changes in the ability to increase the skin blood flow at 40°C after a ten day period of massage two times a day (Fig. 2). The maximum effect in skin blood flow appeared after 3.5±0.3 min. Within the ten day period of massage no increased effect from the massage could be observed at the end of the period. The skin blood flow at ambient temperature recorded on the ventral part of the thigh was greater than that recorded on the lateral part of the hip in all the patients (Fig. 3). The mean differences 15±2 are statistically significant (p<0.01). The differences in skin temperature are not statistically significant.

Group B
In group B the measurements were made on twenty patients in the morning and on nine patients after lunch. The differences in the skin blood flow between the two groups are not statistically significant. In the further analysis, they are therefore combined.

The recorded skin blood flow at ambient temperature varied between the left and the right side and between the two measurements before the ther-
Table 1. The distribution of age, body temperature, skin temperature, ambient temperature and blood pressure

<table>
<thead>
<tr>
<th>Group</th>
<th>Temperature</th>
<th>Blood pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>Body</td>
</tr>
<tr>
<td>A (n=10)</td>
<td>84.7±5.5</td>
<td>36.6±0.2</td>
</tr>
<tr>
<td>Treatment area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (n=20)</td>
<td>76.1±2.8</td>
<td>36.9±0.3</td>
</tr>
<tr>
<td>Before thermal stimulus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After massage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (n=20)</td>
<td>77.1±10.2</td>
<td>36.7±0.6</td>
</tr>
<tr>
<td>Normal skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin with discoloration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Group C
Fifteen patients, 7 women and 8 men, with skin discoloration were measured before and after the massage. The implementation was made at the centre of the area of the injured skin 30 min after relief from pressure and on normal skin about 10 cm from the edge of the discoloration. The discolorations were situated on the lateral part of the hip, iliacal tuberosity, sacrum, or on the calcaneal tuberosity. The patients suffered from cerebral haemorrhage, senile dementia, arte-
riosclerosis, diabetes mellitus, rheumatoid arthritis, Purkinje’s disease, fracture or tetraplegia.

The skin blood flow was measured with the laser Doppler flowmeter equipped with a thermostatic probe holder (5 cm) to permit measurement during thermal stimulus (26 to 40°C). In group A a prototype ML-V IMM 659 Serial: 07 with full scale 5 V was used. In groups B and C a Perthes MD with full scale 10 V was used (Permed, Stockholm, Sweden). Laser Doppler flowmetry is a non-invasive technique that measures the velocity of moving red cells to a depth of approximately 1 mm. This technique gives a measure in millivolts which is linearly related to blood flow (10). The skin temperature and the ambient temperature were measured with a thermostatic tempera-
ture probe (Yellow Springs Instrument Co., Yellow Springs, Ohio). Additional measurements were body temper-

ature and blood pressure. In group A, blood pressure and body temperature were measured in the 5 day period before and after the massage period. The massage was given within each group by one and the same individual who was trained in the massage technique.

The characteristic of the patients in groups A, B and C are shown in Table 1.

The effect of the stimuli on the skin blood flow was calculated from the maximum blood flow. Statistical methods used in this study are arithmetic mean, standard deviation, regression analysis, Student’s t-test, Wilcoxon test and chi-square test. When more than one measurement has been made per variable the mean obtained from the measures is used for the calculations.

RESULT

Regression analysis indicates a significant positive correlation between skin temperature and basal skin blood flow in the treatment area (p<0.01), a negative correlation between mean arterial pressure and basal blood flow in the skin blood area (p<0.05) and the control area (p<0.01) in group A (Table 1). A significant positive correlation between the variables body temperature (p<0.05), mean arterial pressure (p<0.01) and the changes in skin blood flow in response to thermal stimulus and between skin temperature before the massage and the changes in skin blood flow in response to the massage (p<0.05) were found in group A (Table 1).

A significant negative correlation was found between mean arterial pressure and the changes in skin blood flow in response to massage in subgroup 3 in group B on the left side of the body (p<0.05) (Table 1, Fig. 4).

Fig. 1. The recorded blood flow values in millivolts in normal skin over the lateral part of the hip before and after the massage measured with a laser Doppler flowmeter in group A (n=15). The values are calculated from ten measurements each except patient number 6 which are based on 9.

Fig. 2. The recorded blood flow values in millivolts in normal skin over the lateral part of the hip (treatment area). Basal and maximum blood flow at 40°C five days before and after a ten day period of massage in group A (n=15).

GROUP A

For four of the patients there was an increase in the skin blood flow recorded 1.3±0.4 min after the massage was implemented, the mean of the differ-
ences was 46.2±31.4 mV (Fig. 1). The six patients had eitherunchanged blood flow or slightly in-
creased or decreased changes recorded after 0.5±0.4 min. These six patients suffered from cere-
bral haemorrhage and senile dementia. The patients with senile dementia were on no medications while the other patients were. One woman with senile dementia had no recorded increase in her skin blood flow nine days of ten with massage but day number two in the massage period an increase in the skin blood flow of 866% was recorded.

To investigate the long-term effect of the mass-

age, the measurements at ambient temperature and with thermal stimulus five days before and five days after a ten day period of massage were com-
pared both on the treatment area and on the control area. The results indicated no changes in the skin blood flow at ambient temperature and no changes in the ability to increase the skin blood flow at 40°C after a ten day period of massage two times a day (Fig. 2). The maximum effect in skin blood flow appeared after 3.5±0.3 min. Within the ten day period of massage no increased effect from the massage could be observed at the end of the period.

The skin blood flow at ambient temperature re-
corded on the ventral part of the thigh was greater than that recorded on the lateral part of the hip in all the patients (Fig. 3). The mean differences 15±2 are statistically significant (p<0.01). The differ-
ences in skin temperature are not statistically sig-
nificant.

GROUP B

In group B the measurements were made on twenty patients in the morning and on nine patients after lunch. The differences in the skin blood flow be-
tween the two groups are not statistically signifi-
cant. In the further analysis, they are therefore combined.

The recorded skin blood flow at ambient tem-
perature varied between the left and the right side and between the two measurements before the ther-

Scand J Rehab Med 17
Fig. 3. The recorded blood flow values in milliliters at ambient temperature in normal skin over the lateral part of the hip and over the ventral part of the thigh measured with a laser Doppler flowmeter in group A (M±SD).

Fig. 4. The recorded blood flow values in milliliters measured with a laser Doppler flowmeter in normal skin over the lateral part of the left and right hip. Basal blood flow before thermal stimulus and massage. Maximum blood flow at 40°C and after massage for 3 min with liniment. M±SD for group B divided into subgroups 1, 2, and 3 on the basis of their recorded reaction to massage.

Fig. 5. The recorded blood flow values in milliliters at ambient temperature and at 1, 3, 5, 7, and 9 min after the massage was implemented in skin with discoloration (red or reddish blue). The numbers represent individual patients in group C.

DISCUSSION

In the present investigation the effect of massage on the local skin blood flow was studied. Some patients increased their skin blood flow significantly after the massage was implemented, while others did not. The long-term effect as measured by the response to thermal stimulus could not be demonstrated in this study, depending either upon no effect from the massage or too short a period of massage to give a long-term effect. The patients with discoloration (red or reddish-blue) reacted principally with a reduced skin blood flow after the massage was implemented, either in the normal skin or in the injured skin, seven patients in both sites. Hovind et al. (4) found that kneading (foulage) gave no net increase in skeletal muscle blood flow in healthy young individuals, but emptied the venous reserves during the treatment and Paaske et al. (6) found no significant increase in cutaneous blood flow after ultrasound was administered.

The massage method used was based on the result of a pilot study and on theoretical descriptions (1,7). The massage was given by one individual who was trained in the massage method. The technique was tested during the studies on the same patient as in the pilot study. The method used in the study to measure the skin blood flow was the laser Doppler flowmetry. The laser light which penetrates the
Fig. 3. The recorded blood flow values in milliliters at ambient temperature in normal skin over the lateral part of the hip and over the ventral part of the thigh measured with a laser Doppler flowmeter in group A (M±SD).

Fig. 4. The recorded blood flow values in milliliters measured with a laser Doppler flowmeter in normal skin over the lateral part of the left and right hip. Basal blood flow before thermal stimulus and massage. Maximum blood flow at 40°C and after massage for 3 min with finnium. M±SD for group B divided into subgroups 1, 2, and 3 on the basis of their recorded reaction to massage.

Fig. 5. The recorded blood flow values in milliliters at ambient temperature and at 1, 3, 5, 7, and 9 min after the massage was implemented in skin with discoloration (red or reddish blue). The numbers represent individual patients in group C.

Discusssion

In the present investigation the effect of massage on the local skin blood flow was studied. Some patients increased their skin blood flow significantly after the massage was implemented, while others did not. The long-term effect as measured by the response to thermal stimulus could not be demonstrated in this study, depending either upon no effect from the massage or too short a period of massage to give a long-term effect. The patients with discoloration (red or reddish-blue) reacted principally with a reduced skin blood flow after the massage was implemented, either in the normal skin or in the injured skin, seven patients in both sites. Hovind et al. (4) found that kneading (fouage) gave no net increase in skeletal muscle blood flow in healthy young individuals, but emptied the venous reserves during the treatment and Paaske et al. (6) found no significant increase in cutaneous blood flow after ultrasound was administered.

The massage method was based on the result of a pilot study and on theoretical descriptions (1,7). The massage was given by one individual who was trained in the massage method. The technique was tested during the studies on the same patient as in the pilot study. The method used in the study to measure the skin blood flow was the laser Doppler flowmetry. The laser light which penetrates the...
REFERENCES


Address for offprints:

Anna-Christina Ek
Clinical Research Center
University Hospital
S-381 85 Linköping
Sweden

SEVERELY MOBILITY-DISABLED PEOPLE ASSESS THE QUALITY OF THEIR LIVES

Richard Stensman

From the Departments of Rehabilitation Medicine and Social Medicine, Uppsala University, Akademiska sjukhuset, Uppsala, Sweden

ABSTRACT. Thirty-six severely mobility-disabled subjects aged 24-52 years using a wheelchair and in most of daily assistance and 36 non-handicapped, matched control-subjects were interviewed. They were asked to rank 30 differ- ent abilities involving physical and mental functions, inter- personal and social relationships, and to rate their overall quality of life (QOL) on a 4-0 point scale. Among the severely mobility-disabled subjects the mean value of self- reported QOL was 8.0, which differs only slightly from 8.3 among the controls. The mean QOL among the disabled showed no significant difference regarding congenital/ acquired and progressive/permanent disability. The 'ability' ranked 1-9 were not directly related to mobility and corresponded among the disabled and non-handicapped. The functions lacking by the severely mobility-disabled pers- ons were rated as less important by the disabled. The diminished QOL is probably a result of personal adjust- ment, compensation by medical rehabilitation and society, as well as positive features of the disability.

Keywords: physical disability, handicapped, movement disorder, quality of life, psychological adaptation, activities of daily living.

Medical rehabilitation and social compensation for the severely Disabled people aim to make their lives as normal as possible as regards living accommodation, transport, employment, leisure, financial situ- ation, etc. Beyond these vital provisions the atti- tudes towards the mobility-disabled are of great importance. Previously, attitudes have largely been characterized by keeping the disabled separate as a minority group that differed from others generating uncertainty and simultaneously feelings of pity. "Normal" attitudes less distorted by prejudice are now developing in countries with a positive handi- cap policy.

Many people with severe motor handicap have described a satisfactory psycho-social situation in spite of their disability. This study intends to inves- tigate the quality of life (QOL) reported by severely mobility-disabled subjects as well as by non-handi- capped subjects, plus their evaluation of the impor- tance of different functions.

The phrase 'quality of life' (QOL) was minted in 1956 as a political slogan in the USA, and has featured in political discussions in Europe since the early seventies. The interest in QOL within sociolo- gy and medicine probably represents a striving towards a comprehensive view of the individual and his/her situation. This is contrary to earlier studies where the standard of living was objectively measured by physical abilities, mental and physical health, and/or social activities and relations. In or- der to evaluate QOL, different methods have been used. In fundamental studies Andrews & Withey (1974); Allardt (1976) and Campbell et al. (1976) utilized both objective and subjective data, while Næss (1979) leaves it to the investigator to rate the QOL of the interviewed subject. Other important studies concerning QOL and values in life are those of Cantril (1965), using a 0-10 rating scale with over 23,000 people in 12 different countries, and the in- vestigations of Flanagan (1982) who defined the main determinants of quality of life in three age groups of Americans. The determinants were found by using the 'critical incident technique'. The litera- ture on QOL is rather extensive for bibliography, see Kajndal, 1981) and will only be alluded to when of importance to this investigation.

Quality of life of patients with various chronic diseases has been the subject of individual studies. Lichtenhahn et al. (1977) interviewed 38 patients following kidney transplantation and found a "defini- tive improvement of the quality of life". Malm et al. (1981) developed an instrument for measuring QOL and tested it on 30 patients with schizophren- ia. Dettmer & Albinson (1983) studied QOL in 52 patients with head and neck cancer and 104 control subjects. They found a very high correlation be- tween poor prognosis and low health index/low quality of life, but cancer patients with a good