The Effect of Dissociation on the Sensory Status

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ABSTRACT

The sensory status has been studied for many years. Some feel very strongly that Bagolini striated lenses and the Worth 4 Dot test provide vital information regarding patients' overall ability to maintain fusion and/or alignment. Furthermore, some feel strongly that these tests should be done early in the exam, preferably first, so as not to disturb the patient's tenuous hold on fusion. There are no known documented studies that compare sensory tests taken at the beginning of the exam to those taken at the end of the motility exam.

Our study found that obtaining sensory results of Bagolini striated lenses and Worth 4 Dot glasses done at the conclusion of the evaluation produce the same or better fusional abilities when these tests are done prior to dissociation.

INTRODUCTION

Dissociation is a property of a test to alter the casual seeing conditions. There are many sensory tests including stereopsis, red glass test, diplopia test, synoptophor/amblyoscope, after-image, Worth 4 Dot (W4D), and Bagolini striated lenses. Many people have their favorite tests that they feel provide the best information, and there are a few practitioners who even do all these tests. For this study, only the Worth 4 Dot and Bagolini striated lenses were repeated for comparison.

The purpose of this study was to determine if there was a difference in a patient's sensory status if the sensory testing was done following dissociation with visual acuity testing and/or alternate cover testing compared to results (with these same test objects) at the beginning of the exam.
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PATIENTS AND METHOD

Eighty-six patients were studied who had full orthoptic evaluations with sensory tests (Bagolini and Worth 4 Dot) done prior to any dissociation, then again at the very end of the exam. Understanding of the tests and knowledge of colors were the inclusion criteria. All patients also received complete ophthalmological evaluations. Of the 86 patients, 68 were strabismic and 18 were non-strabismic. Ages ranged from 4 to 74 years, 57 were male and 39 were female. The strabismic diagnoses included accommodative esotropia, residual esophoria or ET, intermittent XT and consecutive XT, convergence insufficiency and accommodative insufficiency, IV cranial nerve paresis, VI cranial nerve paresis, amblyopia, nystagmus, monofixation syndrome, acquired ET, hypertropia, and sensory XT.

All patients had the Bagolini striated lenses tested at near, all had the Worth 4 Dot test at near (1/3 meter) (using large/peripheral circles), and all patients were tested with the same Worth 4 Dot flashlight at distance (10 feet) to determine the distance foveal fixation. These were carried out in random order and random color over the right and left eyes.

RESULTS

Twenty-one patients out of the 86 had changes in their responses to the sensory tests. Ten had changes of simply switching the fixating eye. There were 9/21 who made changes for the better when the sensory status was done at the end of the exam. Two out of the 21 had changes for the worse when their fusional ability deteriorated at the end of the exam. Of the two who lost binocularity, one patient fused with the Worth 4 Dot at near early, then alternately suppressed at the end of the exam. The other patient alternately suppressed with the Worth 4 Dot at distance in the beginning of the evaluation, then at the end of the exam, reported intermittent diplopia with the Worth 4 Dot at distance.

Out of the 9/21 who improved their fusional status, two patients suppressed the near peripheral targets early, and later reported fusion at the end of the exam. Two patients who suppressed distance foveal Worth 4 Dot targets early, reported fusion later on these same distance foveal targets. One patient had suppression on the Bagolini early, then fusion; one child reported suppression on distance Worth early who later reported intermittent fusion; one had diplopia with near W4D, then reported fusion; another first reported intermittent fusion with distance W4D, then fusion with this same distance W4D and finally one person reported alternate suppression with near Worth targets early in the exam and intermittent fusion on the same near Worth targets late in the exam.

DISCUSSION

Proponents for early sensory testing feel the Bagolini, Worth 4 Dot, and stereopsis testing should be done first. We are all taught the Bagolini striated lens test is the least dissociating test and that the Worth 4 Dot is a very dissociating test. (We will discuss stereopsis later.) Proponents feel the sensory tests should be done first or the patient’s fusional ability will be broken and may never be regained for that visit. There are patients who break fusion easily with just a quick cover-uncover movement. However, we are also taught that stereo testing and other sensory testing are very strong stimuli to fuse. Again, most orthoptists and strabismologists have seen those patients who have good stereopsis and fuse intermittently even though they have been tropic for part of the exam.
There are practitioners who do not feel the absolute necessity of checking the sensory status prior to dissociation by either visual acuity or alternate cover testing. Many have observed patients to have normal binocularity and stereopsis when tested at the end of the motility evaluation. The nine who improved certainly did not lose any binocularity nor did the 10 who remained the same late in the motility evaluation.

The purpose of sensory testing is to establish the depth and type of binocular coordination or lack thereof. One can monitor therapy by using sensory tests to determine if a patient continues to suppress, has diplopia or fusion with whatever mode of therapy is in place. Another reason to check the Bagolini lens response and/or the Worth 4 Dot response is to help predict the prognosis of the therapy. If there is deep seated suppression, fusion may be unlikely. Finally, one may use sensory tests to help determine the condition of the sensory status in the past. For example, if suppression continues even when the patient is overcorrected with prisms, this would indicate that the patient with an XT made ET with prisms and continues to suppress is most likely a secondary XT as he is still suppressing nasal retina.

“All tests for retinal correspondence introduce an artificial situation that may affect the test to a greater or lesser degree.” The Bagolini striated lenses are very similar to everyday life as they do not affect visual acuity or accommodation and may be done at distance or near. Many authors mention W4D testing, but none refer to any study that documents the fusional breakdown at the end of dissociation. von Noorden reminds us there is a prerequisite to the W4D besides knowing colors, and that is to have an absence of deep amblyopia. A disadvantage to the W4D is that it is a gross test. Even with dense central suppression, a patient may report fusion. Kramer reminds us to first put on the goggles prior to showing the flashlight. Smith reminds us of the importance of switching the colors to the other eye if we suspect memorization. Frank et al reported that there were discrepancies with the actual equipment of the W4D. They reported that there are different sizes of targets with different W4D flashlights, which is a problem with reproducibility. We know retinal correspondence may change, but if there is no consistency in different rooms with the exact same flashlight and size lights, the results will be tainted. Our study had all the patients using the same W4D flashlight for near peripheral targets and distance foveal targets as we carried the same flashlight from room to room for every patient. We also used the same day results.

Proponents for early sensory testing also feel stereopsis should be done prior to any dissociation. They feel the patient might lose vital binocularity and possibly will not have one’s best stereo for that day if there is any disruption with fusion. A study that compared early stereo testing and late stereo results found no significant reason for doing stereo first. In fact, about half of the patients actually improved when the stereopsis was determined at the end of the exam.

CONCLUSION

We report 86 patients who had Bagolini lenses and Worth 4 Dot testing done at the beginning of the orthoptic evaluation (prior to any dissociation) and again at the end of the exam (after visual acuity, alternate cover testing, etc.). We found nine patients who actually improved the sensory status while testing at the end of the evaluation. There were 10 more who did not change their sensory responses, so 19/21 or 90% remained unchanged or improved.
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by doing these tests at the end of motility exam. There may have been a learning curve for these improvements. Only 2/86 lost fusional ability by checking the sensory status late. Therefore, there is no statistical significance in doing the Bagolini striated lenses, the Worth 4 Dot flashlight, or stereopsis prior to dissociation.

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REFERENCES

1. Lecture by Cynthia Avilla, CO, and Gunter von Noorden, MD, Texas Children’s Hospital, Baylor College of Medicine, Houston, TX during orthoptic program 1978–80.


Key words: sensory status, Bagolini striated lenses, Worth 4 Dot test.