The Effect of Single-Session Modified EMDR on Acute Stress Syndromes

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A single session of a modified, abridged EMDR protocol was provided in a general hospital inpatient and outpatient setting to 86 patients with acute stress (AS) syndrome suffering from intrusion distress following accidents and terrorist bombing attacks. Fifty percent reported immediate fading of intrusive symptoms and general alleviation of distress, 27% described partial alleviation of their symptoms and distress, while 23% reported no improvement. Partial and nonresponders were provided with or referred for more comprehensive treatment. At 4-week and 6-month follow-up, the immediate responders in the terror victims group remained symptom free. The immediate responders tended to have uncomplicated AS symptoms with fewer risk factors for posttraumatic stress disorder (PTSD), while the nonresponders had higher exposure to former traumas and endorsed more risk factors for PTSD. These results support other anecdotal reports on the rapid effects of brief EMDR intervention on intrusive symptoms in early un-complicated posttraumatic cases. Although more controlled studies are essential, this immediate method for symptomatic relief may be a potential addition for focused interventions in acute trauma victims.

Keywords: EMDR; acute stress syndrome; intrusions; mass casualty event (MCE); PTSD

Soon after isolated or mass traumatic events, victims often develop acute stress (AS) syndrome. While most victims recover over weeks or months, symptomatic suffering in the acute phase may be considerable, and the potential risks for chronic posttraumatic stress disorder (PTSD) pose a problem for the victims, their families, and their therapists. Applying a single session of abridged, modified EMDR in the acute phase was anecdotally observed by the authors to alleviate most AS symptoms and dramatically abolish the intrusive symptoms of the acute phase. The current study reports the effects of applying a single session of modified abridged EMDR to 86 accident and terrorist-bombing victims in the acute phase at a general hospital inpatient and outpatient setting.

The Nature of Acute Stress Syndromes

The dire psychological consequences of wars, terrorist attacks, and disasters, both natural and man-made, have made chronic PTSD a well-recognized diagnosis with richly documented psychotherapeutic interventions (Bradley, Greene, Russ, Dutra, & Westen, 2006). In contrast to the time-honed definition of chronic PTSD, the early phases of posttrauma are poorly defined, the information on the biology and psychology of acute stress syndromes is relatively sparse, and the efficacy and role of early intervention for acute stress syndromes have not been sufficiently delineated.

Currently, psychiatric manuals identify three time-related definitions of acute, posttraumatic stress:

acute stress reaction (ASR) (World Health Organization, 2006), acute stress disorder (ASD), and acute PTSD (American Psychiatric Association, 1994). These categories have been subject to conceptual criticism (Harvey & Bryant, 2002). Our recent clinical experience with terror and accident victims also supports modifications of these definitions. For example, the border (4 weeks) between ASD and acute PTSD seems utterly arbitrary, and both ASD and acute PTSD seem to form a continuous AS syndrome.

In contrast to chronic PTSD, where many of the symptoms (e.g., anhedonia, narrowing of interest, dysphoria, rage attacks) reflect the permanent generalized *dysregulation* of the reactive system itself, the symptoms of AS syndrome represent the interim adaptive attempts of the reactive system in its struggle to restore equilibrium. Thus, all symptom clusters of AS syndrome (hyperarousal, avoidance, dissociation, and intrusions) may reflect psychophysiological attempts to deal with the memory residues of the traumatic event. These symptoms are transitory at most and disappear within weeks to months following the event (Ginzburg et al., 2003; Karamustafalioglu et al., 2006; Kutz & Dekel, 2006; Shalev & Freedman, 2005).

Intrusive symptoms in particular are central and ubiquitous AS symptoms. We have found that they are present from the very first minutes and hours after the event (Kutz & Bleich, 2005) and are most dominant over the next days, weeks, and even months, with varying intensity and frequency. Intrusions may take the form of daytime flashbacks generated spontaneously, more frequent during idle mental states or twilight states, like before falling asleep or soon after waking up. They are also provoked by environmental or emotional cues and stressful periods. During sleep, intrusions may harass the victim as nightmares directly representing the traumatic memory or as dreams filled with nonspecific catastrophic dread. The ubiquity of intrusions in the immediate and acute phase in almost all those who respond with AS symptoms suggests that reexperiencing the traumatic occurrence is an obligatory, nonpathological manifestation of the process of adaptation. Hence, intrusions per se, certainly in the *immediate* ASR phase, do not necessitate intervention. However, when intrusions persecute the trauma victim without abating, inflicting suffering over days, weeks, or months, intervention is indicated.

EMDR and Acute Stress Syndromes

Eye movement desensitization (EMD) was the original treatment developed by Francine Shapiro (1989).
It consisted originally of bringing to mind an image of a traumatic event while visually tracking, in a saccadic-like motion, the therapist's index finger as it moved back and forth in front of the trauma victim's eyes. The intervention was reported to "desensitize" the traumatic memories. Gradually a fuller protocol of EMDR (Shapiro, 1989a, 1995) developed as a comprehensive therapy for the complex multifaceted and tenacious symptoms of chronic PTSD. Its rationale was based on accessing and activating the multiple strata of old traumatic memories, including related cognitive elements, and reprocessing these and whatever associations arose. With time, it became apparent that other forms of alternating bilateral stimulation (ABS), such as right–left auditory or tactile stimuli applied during activation of traumatic memories, achieved similar effects (Servan-Schreiber, Schooler, Dew, Carter, & Bartone, 2006; Shapiro, 2001). EMDR was shown to be effective in 16 randomized clinical trials (e.g., Rothbaum, Astin, & Marsteller, 2005; van der Kolk et al., 2007). It has been identified as an empirically supported PTSD treatment together with other interventions such as prolonged exposure and cognitive restructuring (see Bisson & Andrew, 2007; Bradley et al., 2006) and is endorsed by numerous treatment guidelines.

In contrast to PTSD studies, to date trials on the effect of EMDR on acute stress (AS) syndromes are conspicuously meager, with very few cases described (Fernandez, 2008; Ichii, 1997; Russell, 2006) usually performed several months after the event (Colelli & Patterson, 2008; Grainger, Levin, Allen-Byrd, Doctor, & Lee, 1997; Silver, Rogers, Knipe, & Colelli, 2005). Controlled studies on AS syndromes have not been published at all.

Ten years ago, when we first attempted EMDR on some of our general hospital (GH) patients who displayed AS syndromes, they responded with dramatic relief of their symptoms, particularly the intrusive ones, often within a single session. We therefore developed an abridged, modified single-session EMDR (SS-Modified-EMDR) protocol aimed at focused symptom relief for AS symptoms. With the rise of frequency of terrorist attacks in Israel, we applied the same single-session protocol to victims of mass casualty events (MCEs) suffering from AS.

In this article we describe the outcome of modified abridged single-session EMDR on intrusive phenomena and the accompanying distress of AS symptoms in victims of terrorist bombings, motor vehicle and other kinds of civilian accidents, and traumatic events.

Method

Participants

Two kinds of victims of trauma suffering from AS syndromes were treated by SS-Modified-EMDR at the Meir General Hospital Trauma Unit (see Table 1).

Victims of Terrorist Attacks. Eighteen males and 22 females, ages 18 to 64, exposed to three separate suicide bombing attacks, mostly in crowded malls, were treated from 2003–2005 in the acute trauma outpatient clinic in the first few days and weeks following the traumatic event. Members of this cohort were not physically injured or suffered only slight physical injuries. These participants were first seen by our teams immediately upon arrival at the emergency ward (EW) within an hour after the event. Their immediate peritraumatic responses were evaluated, and they were provided with individual and group support, after which they were evaluated again before release from the EW, 3–5 hours later. Those who did not display satisfactory coping within those hours were invited for outpatient intervention within 2–4 days. Others who displayed good coping were told to contact the outpatient clinic if their symptoms persisted or intensified.

Follow-up was available for this group at 4 weeks and 6 months after the single-session intervention. Twelve of this group had been exposed to former significant traumas, mostly former terrorist attacks.

Victims of Accidents. This group consisted of 46 victims of accidents (road, work, home, or nature): 26 females and 20 males, age 18 to 81. Thirty-six (78%) were inpatients (surgical and orthopedic) and 10 (22%) were outpatients. All inpatients were physically injured. All outpatients had mild physical injury or none at all. The SS-Modified-EMDR interventions were part of consultations performed over 10 years (1996–2006) by three members of the consultation–liaison team. Follow-up was maintained only for several days for the accident victims. Those who showed partial or poor responses to the SS-Modified-EMDR intervention were referred for insurance reasons to other treatment providers for more comprehensive treatment. Eight of the victims had been exposed to former significant traumatic events.

Inclusion Criteria. The SS-Modified-EMDR treatment was offered to all patients whose intrusive AS symptoms had not subsided for at least several days. Symptoms consisted of reexperiencing the traumatic event, either as a repeated mental picture, a physical sensation, or both, and/or intense preoccupation with the traumatic event. Many suffered from additional symptoms like sleep disorders, hyperarousal, hypervigilance, avoidance, and brief dissociative events.

Exclusion Criteria. Individuals whose initial Subjective Units of Disturbance Scale (SUDS) score was 5 or less were deferred for further evaluation and not included in the study. Those suffering from acute grief reactions and *severe* protracted dissociative responses were also excluded from the study and were treated separately after a prolonged period of stabilization.

Timing of Intervention. The intervention was introduced when complaints of symptom distress did not subside. Timing of intervention was anywhere between 4 days and 4 months after the traumatic event. Sixty patients (~70%) underwent treatment within the first 2 weeks. Another 20 patients presented for treatment between 3 to 4 weeks following the event. Six patients were treated 4 weeks to 4 months after the traumatic event.

Alternating Bilateral Stimulation (ABS). Until 2005, the ABS used by our team consisted of the eye movement method only; this was provided to 62 participants. Since the end of 2005, 24 participants received an alternating vibrating tactile form of bilateral stimulation. The alternating vibration stimulus was delivered to both palms using the Tac/Audio Scan™ machine. The participants held two coin-size diskettes in their clenched palms with eyes open or closed. Upon commencement of the set, the diskettes began alternating the vibrations between right and left palm in a frequency of about 60 per minute. The set duration was 45–75 seconds. We found this tactile vibrating ABS easier to administer, with overall improved compliance among elderly patients, bedridden patients, or those who

TABLE 1. Participant Characteristics

Participant characteristics	Terror victims (n = 40)		Accident victims (n = 46)	
Gender	f 22	m 18	f 26	m 20
Age	18–64		18–81	
Inpatient/ Outpatients	Outpatients only		36 inpatients: 10 outpatients	
Physical injury	None or insignificant		All injured	
Former exposure to trauma and other risk factors of PTSD	12 (30%)		10 (22%)	

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preferred to focus on the traumatic experience with closed eyes. This form of stimulation also allowed uniformity of stimulus.

The Modified, Abridged, Single-Session EMDR Protocol for AS Syndromes

The modified abridged single-session EMDR protocol focused primarily on the ABS element of the standard EMDR protocol and did not include the stepwise cognitive processing elements of the protocol used for more complex PTSD patients. Participants were seated when possible, but injured inpatients were often treated lying in their hospital bed.

The single-session modified EMDR for AS symptoms contains the following steps:

Evaluation and Screening

1. A brief clinical assessment and history-taking for former traumatic experiences and other risk factors, such as past psychiatric illnesses or problems, family history, medications, and premorbid personality and function. The presence and strength of the patient's support system are also evaluated. Details of the nature and intensity of the peritraumatic response are also obtained.

Intervention

1. Describing, in brief, the nature of the intervention and providing a disclaimer that "the intervention may or may not help the distress": Sometimes a 1–2 second demonstration of the ABS is provided to clarify the procedure.
2. Asking the patient to focus on the most distressing sensory (picture, sound, smell) or bodily (pressure, suffocation, anxiety) experience, or cognitive preoccupations related to the traumatic event. Patients in the acute phase have little difficulty doing so. In fact, what characterizes most participants at this stage is the inability to be free of such distressing intrusions. The distress level and vividness of the experience are rated by the Subjective Units of Disturbance Scale (SUDS) (see below).
3. Commencing the first set of ABS for about 45 seconds while the patient is focusing on the distressing intrusion.
4. Following the first stimulation set, the participant is asked to describe his or her emerging experiences (feelings, sensations, ideations, and associations). The mental distress caused by the original intrusion is then reevaluated by the change in SUDS. If the intrusive distress remains unchanged, increases,

or only mildly decreases in intensity, another set is added. If the intrusive distress disappears completely and the patient cannot summon any sense of distress, a second set ascertains that the alleviation indeed persists.
5. If a new aspect or mental picture of the *current* traumatic event is reported, the participant is asked to focus on that new experience, and a new stimulation set is performed. If a memory of a traumatic event from the more distant past emerges, the patient is asked to continue focusing on the present distressing memory and to try to ignore the more ancient association.
6. The number of sets, each lasting about 45–75 seconds, continues until there is a marked and steady improvement. Six to eight sets are attempted if no improvement is recorded or if only partial attenuation of the distress has occurred. Thus, the length of the single session varies. In rapid and complete responders where only one to three sets are needed, the session may last only 30–40 minutes. In those whose SUD does not recede rapidly and for whom additional sets are needed, the session may last 60 minutes or more.

Measures

Subjective Units of Disturbance Scale. An 11-point SUDS (0 = no disturbance; 10 = highest disturbance possible) assessed the level of distress related to the flashbacks and traumatic experiences (Wolpe, 1982). For those who had difficulty verbally rating their distress, an 11-point visual analogue scale (VAS) was used. The evaluation was carried out at the end of each set, the end of the session, and 2–6 days following the single session. The terror victim group was followed up at week 4 and 6 months following the intervention.

Results

The response of 86 terror and accident victims to a single session of a modified abridged EMDR was divided into three categories as depicted in Tables 2 and 3 and Figure 1.

For the purposes of data analysis, participants were sorted into three groups: "Immediate Relief," "Substantial Relief," and "No Relief." These categories were created arbitrarily, as these seemed to best fit the data. Subsequent analyses (see below) determined that these were indeed distinct groups. Further research is needed to determine if these categories are found in other populations or if they require revision.

TABLE 2. The Effect of Single-Session Modified EMDR on Accident Victims Group

Mode of Response	N	SUD Scores		Significance of Pre/Post Difference
		Pre	Post	
Immediate relief	27	7.0 SD = 1.17	1.2 SD = 0.80	P < .0001
Substantial relief	11	8.3 SD = 1.1	3.5 SD = 1.9	P < .0001
No relief	8	8.5 SD = 1.2	8.1 SD = 1.64	P = .06

Immediate and Complete Relief

Participants were included in this group when their SUDS score decreased from 6–10 to 0–2 within the single session and when their relief persisted upon examination 2–4 days after the session. These included 43 (50%) of the 86 participants: 59% of the accident victims and 40% of the terror victims (see Tables 2 and 3). The mean SUDS scores of the accident victims and terror victims dropped from 7.0 (SD = 1.17) and 7.5 (SD = 1.2) to 1.2 (SD = 0.79) and 0.9 (SD = 0.81), respectively. The decrease in SUDS scores was statistically significant for both accident victims ($t[26] = 22.37$, $p < .001$) and terror victims ($t[15] = 18.48$, $p < .001$).

Phenomenologically, by the end of the single session it seemed like the vivid traumatic reexperiencing of the immediate relief group was transformed into a distant nonintrusive memory. At the end of the session, and during the next day or two, participants reported a "fading away" of the acuity of the traumatic experience or its transformation into a blurred image or distant sensation. They described an inability to reexperience that disturbing image or sensation upon demand the way they had been able to do at the onset of the single session. This dramatic cessation of intrusive symptoms was almost always accompanied by a visible display of emotional relief, often accompanied by a new positive cognitive appraisal of their situation.

In some members of this group, after the initial set or two there was a direct transition from the distress of vivid intrusions to a state where there was little ability to focus on or "get into" the traumatic experience again. In others, the first or second set provoked an initial temporary aggravation of their distress that dissipated upon subsequent sets within that single session.

Long-Term Follow-Up

Long-term follow-up was available for the terror victims only. The 16 immediate responders did not receive any additional treatment (see Table 3). They all participated in the telephone interviews conducted 4–6 weeks following the trauma. Twelve reported sustained improvement on all symptoms, with SUDS scores of 0–2. Four of these 16 immediate respondents, while reporting no intrusions, complained of occasional nocturnal awakenings, with SUDS ranging from 2–4. The mean SUDS score for the 16 immediate responders at 4 weeks for the terror group was 1.0 (SD = 1.36). At 6 months follow-up, 12 of the 16 were symptom free, 2 reported temporary exacerbation due to subsequent exposures to terror attacks. Two others were unavailable for report.

Substantial Relief

Participants were included in this category when, following the single session, their SUDS scores dropped from 6–10 points by 4 points or more but remained between 3–5 points. These included 27% of the 86 participants: 24% of the accident patients and 30% of the terror victims (see Tables 2 and 3). The mean SUDS scores of the accident victims and terror victims

TABLE 3. The Effect of Single-Session Modified EMDR on Terror Victims Group

Mode of Response	Within Session				4-Week Follow-Up			6-Month Follow-Up	
	N	PRE SUD	POST SUD	Significance of Pre/Post Difference	N	SUD	Significance of Post/Follow-Up Difference	N	SUD
Immediate relief	16	7.5 SD = 1.2	0.9 SD = 0.8	P < .0001	16	1.0 SD = 1.36	P = .75	14	1.4 SD = 1.2
Substantial relief	12	8.2 SD = 1.03	3.7 SD = 0.49	P < .0001	12	2.5 SD = 3.3	P < .05	12	1.8[a] SD = 2.7
No relief	12	8.6 SD = 1.07	8.3 SD = 1.15	P = .47	12	6.67[a] SD = 1.50		8	5.3[a] SD = 2.05

[a] Results reflect addition of multiple sessions of EMDR and/or additional non-EMDR interventions.

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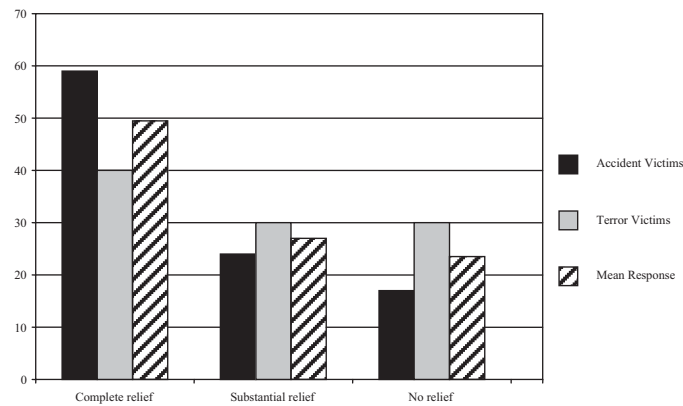Kutz et al.

FIGURE 1. Response to single-session modified EMDR in 86 trauma victims with acute stress syndrome.

dropped from 8.3 ($SD = 1.19$) and 8.2 ($SD = 1.03$) to 3.5 ($SD = 0.52$) and 3.7 ($SD = 0.49$), respectively. The decrease in SUDS scores was statistically significant for both accident victims ($t[10] = 13.69$, $p < .001$) and terror victims ($t[11] = 12.54$, $p < .001$). The substantial relief participants described considerable reduction in their intrusions and other distress symptoms by the end of the first session. This was maintained on a subsequent evaluation 2–4 days later.

Long-Term Follow-Up. Long-term follow-up was available for the terror victims only (see Table 3). The mean SUDS level at 4 weeks was 2.5 (SD 3.3).

Subsequent Treatment of the Terror Victims. The 12 terror victims in the substantial relief group were considered partial responders and were provided with full protocol EMDR sessions after 4-week follow-up. Six of the 12 responded with full relief. Three others who did not respond to further sessions of EMDR continued to improve on other interventions (e.g., medications, hypnosis, and relaxation combined with exposure therapy). Three did not show alleviation with any intervention and continued to suffer from midlevel distress. At 6 months, 10 of these 12 substantial responders among the terror victims were symptom free, while two continued to complain of persistent symptoms. The mean SUDS level for this group was 1.8 (SD 2.7) at 6 months.

No Relief

Participants were included in this group when there was no reduction in their SUDS scores or the decrease was two points or less. These included 20 (23%) of the 86 participants: 17% of the accident victims and 30% of the terror victims (see Tables 2 and 3). The mean SUDS scores of the accident victims and terror victims in the no relief group dropped from 8.5 ($SD = 1.20$) and 8.6 ($SD = 1.07$) to 8.1 ($SD = 1.64$) and 8.3 ($SD =$

1.15), respectively. These patients showed minimal or no improvement, with no significant decrease in SUDS scores.

Subsequent Treatment and Long-Term Follow-Up. Subsequent treatment and long-term follow-up were available only for the terror victims. (For insurance reasons the accident patients were referred to other treatment providers.) The 12 nonresponders received the full EMDR protocol or other treatments. At 4-week follow-up, 4 patients showed improvement while 8 did not respond. The mean SUDS level was 6.7 ($SD = 1.50$). By the end of 6 months, and after a variety of added interventions, there were marked improvements in 2 of these 8 nonrespondents, and 6 remained with symptoms of PTSD, while their SUDS scores were still above 6. Four of the group were not available for evaluation. The mean SUDS level for the 8 available victims was 5.3 ($SD = 2.05$).

Comparison of the Immediate, Substantial, and No Relief Groups

Comparing the level of the initial SUD scores revealed a significant effect ($F[2,85] = 11.24$, $p < 0.001$). The level of the SUD of the immediate relief group was statistically significantly lower ($M = 7.2$, $SD = 1.20$) when compared to the level of initial SUDS of the substantial relief ($M = 8.22$, $SD = 1.08$) and no relief ($M = 8.60$, $SD = 1.09$) groups. However, as can be seen, the SUD level of all three groups was high.

Response Comparison

Comparing the level of response among the three groups revealed a significant effect ($F[2,85] = 444.73$, $p < 0.001$). The SUD level of the immediate relief group following the intervention was significantly lower ($M = 1.07$, $SD = 0.80$) when compared to the level of the substantial relief group ($M = 3.57$, $SD = 0.51$) and to the level of the

no relief group ($M = 8.25$, $SD = 1.33$). The differences between the last two groups were also significant.

Comparison of Participant Characteristics

Risk Factors. Participants with no history of PTSD risk factors responded better than those with a history of previously existing risk factors for PTSD (mostly former trauma with or without PTSD but also former history of depression, early childhood abuse, personality and family psychopathology, and poor social and occupational history; see Table 4).

Only 10 of the 66 (15%) patients who exhibited a rapid response showing full or substantial relief to SS-Modified-EMDR had pretraumatic risk factors. In contrast, 12 of the 20 nonresponsive patients (60%) had a history of previous exposure to trauma and other risk factors ($\chi^2 = 13.65$, $df = 1$, $p < 0.001$).

Another observation regarding the nonresponders in the terror group was that they displayed a higher demand for material (secondary gain) compensation and/or a greater need for "primary" psychological gains. The material compensation was identified by barely disguised, rapidly appearing monetary claims and insistent preoccupation with being supported by the National Insurance Agency. The need for primary psychological gain was identified by early emotional regression and an exaggerated need to be recognized as victims.

Discussion

A single session of a modified and abridged EMDR protocol applied to accident and terror victims with AS symptoms who suffered primarily from intrusive symptoms was found to be effective in an uncontrolled trial in a general hospital setting. At the end of the single session immediate and complete relief from recurrent intrusive experiences was reported by 59% of the 46 accident victims, partial relief by 24%, and no relief by 17% (see Table 2). Similarly, immediate and complete relief was reported by 40% of the 40 terror victims, partial relief by 30%, and no relief by 30% (see Table 3).

Four weeks after intervention, the immediate relief group maintained its recovery without additional intervention. Six months after the event, follow-up with the terrorist victims showed that most of these initial complete responders remained distress free while a minority displayed some recurring distress due to reexposure to subsequent terrorist attacks in their vicinity. *Partial relief* was recorded in 12 (30%) terror victims. Their longer-term follow-up scores were influenced by additional, full protocol EMDR sessions as well as other modalities of treatment (Table 2). *No relief* immediately following the single session of EMDR was observed in 12 (40%) of the group of 40 terror victims. Four-week follow-up showed that 8 of the 12 nonrespondents, while being treated by full protocol EMDR or other treatment modalities, still showed no clinical improvement. At 6 months, 6 of the 12 initial nonresponders (50%) continued to suffer from significant symptoms despite ongoing treatments by various modalities (Table 3).

The short-term (pre/post) effect of a single-session modified and abridged EMDR protocol on the combined groups demonstrated an immediate evaporation of the intrusive symptoms and subsiding of other distress symptoms in 50% of these 86 patients with AS symptoms. An additional 27% of this combined population responded with marked alleviation of their intrusive symptoms to the single session. Twenty-three percent of this population showed no response to this single-session intervention (Figure 1).

In interpreting these results two main variables should be considered: (a) the pretraumatic risk factors, which include former exposure to trauma, with or without PTSD, and other preexisting vulnerabilities; (b) the natural history of AS syndromes (Ginzburg et al., 2003; Kutz & Dekel, 2006) that demonstrates an eventual recovery for most AS sufferers. The presence of risk factors, in our study, significantly correlated with the single-session pre/post response. Only 15% of the immediate and partial responders had a history of previous risk factors, manifested also by their milder immediate peritraumatic responses. On the other hand, 60% of the nonresponders in both the accident and terror groups endorsed criteria for preexisting risk factors, and their initial peritraumatic response in the first few

TABLE 4. Preexisting Risk Factors and Response to Single-Session Modified EMDR

Risk Factors in Participants		Complete and Substantial Relief ($n = 66$)		Nonresponsive Patients ($n = 20$)	
Risk factors	Terror victims ($n = 12$)	5	10	7	12
	Accident victims ($n = 10$)	5		5	
No risk factors	Terror victims ($n = 28$)	23	56	5	8
	Accident victims ($n = 36$)	33		3	8

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hours after the event were more pronounced. These differences in risk-factor background suggest that the majority of immediate and dramatic responders were suffering from a first-time AS syndrome characterized by intrusive phenomena in response to a single, discreet traumatogenic event, whereas many in the non-responder group displayed an acute response "over" a preexisting vulnerability, mostly previous exposure to significant trauma with or without diagnosed PTSD.

The number of accident victims who responded with complete immediate relief was higher in this study than that of the terror victims (59% vs. 40%). This intervention-response difference may be related in part to the harsher nature of the traumatic experience following an explosive act of terror, which is more out of the ordinary and is more likely to shatter assumptions of safety and existence. Indeed, following exposure to terrorist attacks there is higher incidence of AS syndromes compared to motor vehicle accidents (Kutz & Dekel, 2006; Shalev & Freedman, 2005).

Another possible explanation for the lower response of the terror victims group to the single session of modified EMDR may be the higher prevalence of preexisting risk factors, particularly earlier exposure to terrorist bombings, in our terror group (Table 1). Indeed, the sad reality is that certain locations (markets, malls, central bus stops) in some Israeli towns were/are favorite spots for suicide bombers, and victims exposed to multiple attacks are common.

As a whole, these results indicate that many patients suffering from intrusive traumatic memories following a single discrete traumatogenic event can experience immediate and lasting relief from a single-session, abridged EMDR intervention. This immediate relief, sometimes occurring within minutes in 50% of our patient population, cannot be attributed to spontaneous recovery. Though the trajectory for most AS syndromes patients is favorable, and most acute stress sufferers are likely to improve with the passage of time, this natural recovery occurs over many weeks and does not vanish within minutes of a single-session intervention, as happened with our patients.

Such a robust, immediate response may indicate that the ABS element of the EMDR method has a specific effect on intrusive traumatic memories in acutely stressed patients and probably on other kinds of intrusive states as well. Scrutiny of the literature supports such an assumption. Shapiro's (1989) initial article introducing the technique for the first time described a technique that "can be extremely effective in only one session," and her clinical results were similar to those in our report. Shapiro originally named the intervention EMD (eye movement desensitization).

Later on, to provide a more comprehensive approach for the many layered problems of chronic PTSD, and not just the acute intrusive traumatic memories, she interlaced cognitive elements within the protocol, increased the number of sessions, and added the "R" to the acronym, symbolizing the "reprocessing" needed for working through the complexity of cognitions and emotions in chronic PTSD (Shapiro, 1989a, 1995).

Recent observations of rapid response to a single-session EMDR continue to appear, indirectly suggesting that the ABS element of the EMDR intervention may be essential. Maxfield and Melnyk (2000) demonstrated that a single-session EMDR significantly reduced test anxiety in a group of students compared to the wait-list controls of test-anxious students. While test anxiety is not identical to intrusions of AS, both syndromes share the repetitive, intrusive, cognitive, and emotional fear/distress loop. Hence, it is tempting to speculate that a single-session EMDR may be particularly effective by producing some form of fear extinction.

This rapidity of response of intrusive phenomena after a single session was also noted in certain chronic PTSD studies. Rogers et al. (1999) found that EMDR treatment resulted in greater positive changes in within-session SUDS levels and on self-monitored severity of intrusive recollection in Vietnam PTSD patients, compared to exposure therapy. Ironson, Freund, Strauss, and Williams (2002), who compared the effect of EMDR to prolonged exposure (PE) on 22 rape and crime victims, found that "while both EMDR and PE are equally effective at reducing symptoms of PTSD and depression," there were differences after the first active session where "at the end of the first active session, distress levels as measured by SUDS were lower with EMDR than PE" (p. 123). Marcus, Marquis, and Sakai (2004), in a controlled trial in an HMO setting, reported that a relatively small number of EMDR sessions result in substantial benefits in PTSD patients, results that were maintained over time. Interestingly, Marcus, Marquis, and Sakai (1997) also noted that the recovery rate of those PTSD patients who were exposed to *a single trauma* and who received EMDR treatment was as high as 100%.

Lee, Gavriel, Drummond, Richards, and Greenwald (2002) also noted the particular responsiveness of intrusions to EMDR. In a randomly controlled trial comparing stress inoculation training with prolonged exposure (SITPE) to EMDR in PTSD patients, they found that on global PTSD measures there were no significant differences between the treatments at the end of therapy. However, on the subscale measures of the degree of intrusion symptoms, EMDR did significantly better than SITPE.

Servan-Schreiber (2000) also noted the rapidity of response. "Within a single session, patients often experience intense reliving of some aspect of their trauma. This is quickly followed by a sense of calm and a new understanding of the event that is no longer associated with painful emotions or demeaning negative self-statements" (p. 39). Servan-Schreiber et al. (2006) also recently demonstrated the superior contribution of the ABS compared to nonalternating stimulation using a controlled, randomized double-blind design. Such decrease in intrusive memory, decreased arousal, and a change of cognitive appraisal was also noted by others (Shapiro, 1989; Wilson, Becker, & Tinker, 1995). Indeed, our participants who responded with the cessation of intrusions also experienced a sense of generalized relief or physical relaxation, and some were able to cognitively reappraise the traumatic event more positively.

Skeptics of the EMDR intervention attribute all therapeutic changes of EMDR to the cognitive and/or exposure elements of the full EMDR protocol, dismissively claiming that "what is new in EMDR does not appear to be helpful, and what is helpful is what we already know about relaxation, education, and psychotherapy" (McNally, 1999; Norwood, Ursano, & Fullerton, 2000). The data provided here seem to suggest that the ABS element of the EMDR may have a unique therapeutic effect on intrusive symptoms, at least in the acute posttraumatic phase.

While the mechanism of action of EMDR still remains to be revealed, the fact that traumatic memories in the acute phase respond so readily to the ABS element of the EMDR supports the notion that different memory reconsolidation and extinction mechanisms may be involved in the acute and chronic posttraumatic patients (Suzuki et al., 2004). It may be that in chronic PTSD the old memories (engrams) are consolidated in widespread cortical networks and may be less accessible to reactivation and change (Dudai, 2004), while the immediate response of acute intrusions to ABS may be related to the less complex physiology of *fear extinction*. Basic scientific animal experiments on fear extinction (Akirav & Maroun, 2007; Maroun, 2006; Quirk, Likhtik, Pelletier, & Pare, 2003) underline the importance of the medial prefrontal cortex (mPFC)-amygdala circuit. They posit that under certain excessive fearful conditions the inhibitory mPFC circuitry shuts down, allowing the aroused amygdala to continue generating a heightened sense of fear. These animal experimental data are supported by human imagery studies showing that intense emotions cause increased activation in subcortical brain regions and significant reductions of blood flow in various areas in the frontal lobe (Damasio et al., 2000).

This dysfunction of frontal–subcortical circuitry can also be found in long-standing traumatized individuals (Shin et al., 2001, 2004).

It is tempting to speculate that the interhemispheric activation and synchronization produced by the ABS element of the EMDR (Christman, Garvey, Propper, & Phaneuf, 2003; Christman & Propper, 2001; Propper et al., this issue) somehow reactivates the decreased mPFC activity, thus inhibiting the limbic hyperarousal and extinguishing the fear/distress loop. Such a hypothesis may explain the immediate and robust effect of ABS on the intrusive symptoms in those who suffered recent isolated and discrete traumatic events that presumably still "reside" within the frontal–limbic circuitry. Similarly, this hypothesis may explain why, in cases of chronic traumatic memories, the ABS element of the EMDR is effective only after the traumatic memories are successfully retrieved, that is, presumably reactivated on limbic-mPFC circuit. Likewise, this may explain the slower and sometimes partial effect of EMDR on chronic PTSD patients, whose memories have been consolidated and reconsolidated within multiple cortical networks.

While it may take time and research to confirm or reject a proposed neurobiology for EMDR, clinically applying the single-session modified EMDR to acutely stressed individuals, as a first line of defense, may be a cardinal therapeutic addition. Such a brief intervention can be extremely beneficial for immediately reducing the intensity, duration, and number of acute stress symptoms, most notably intrusive phenomena, in most of those who exhibit AS syndromes. Such repeated intrusions are not always harmless, particularly when endowed with negative idiosyncratic meaning (Steil & Ehlers, 2000). Repeated frightening intrusions may keep sensitizing the traumatic response, presumably through a kindling-like model (Shalev, Bonne, & Eth, 1996). It is this sensitization hypothesis that forms the rationale for anticonvulsant therapy for intrusions in PTSD (Hageman, Andersen, & Jorgensen, 2001).

By rapidly relieving the patients of their symptoms, such a brief EMDR intervention may help protect many AS syndrome patients from inadequate treatments, most notably prolonged exposure to unnecessary medications. This is as true for outpatients as it is for injured inpatients.

Applying a single session of brief modified EMDR protocol may be particularly useful in cases of MCEs, in general hospitals and other civilian or military installations where the number of victims suffering from psychological trauma is high and the number of experienced trauma clinicians may be limited. This brief

intervention also acts as an auxiliary triage system for AS syndrome patients. An immediate recovery lessens the patient load, allowing the direction of more intense therapeutic efforts to the resistant subgroup that is more likely to be at risk for developing chronic syndromes. The question whether chronic PTSD is prevented by a single-session EMDR remains open to further systematic research.

Limitations of the Study

Because of the uncontrolled design of this clinical study and the lack of follow-up for a large group of the participants, the results of this study must be interpreted with caution. Clearly, this report just underscores the need for more tightly designed studies on the effect of single-session modified EMDR in AS syndrome victims.

Conclusions

A single session of modified and abridged protocol of EMDR was found to provide complete relief for 50% and substantial relief for another 27% of acutely stressed patients, most of whom had been exposed to an isolated traumatic event. While the standard EMDR protocol is geared as a comprehensive approach for chronic patients with multiple accumulating issues, this single-session abridged protocol was effective for focused symptom relief in the early phases. It is hypothesized that this rapid effect occurs because the ABS element of EMDR enhances fear extinction in acutely stressed individuals following exposure to a single discrete event. Regardless of the precise physiological mechanism that still awaits elucidation, this brief variation of EMDR protocol can be useful for victims of large-scale disaster / terrorism work, as well as for the day-to-day work with trauma victims in general hospitals and outpatient trauma clinics.

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